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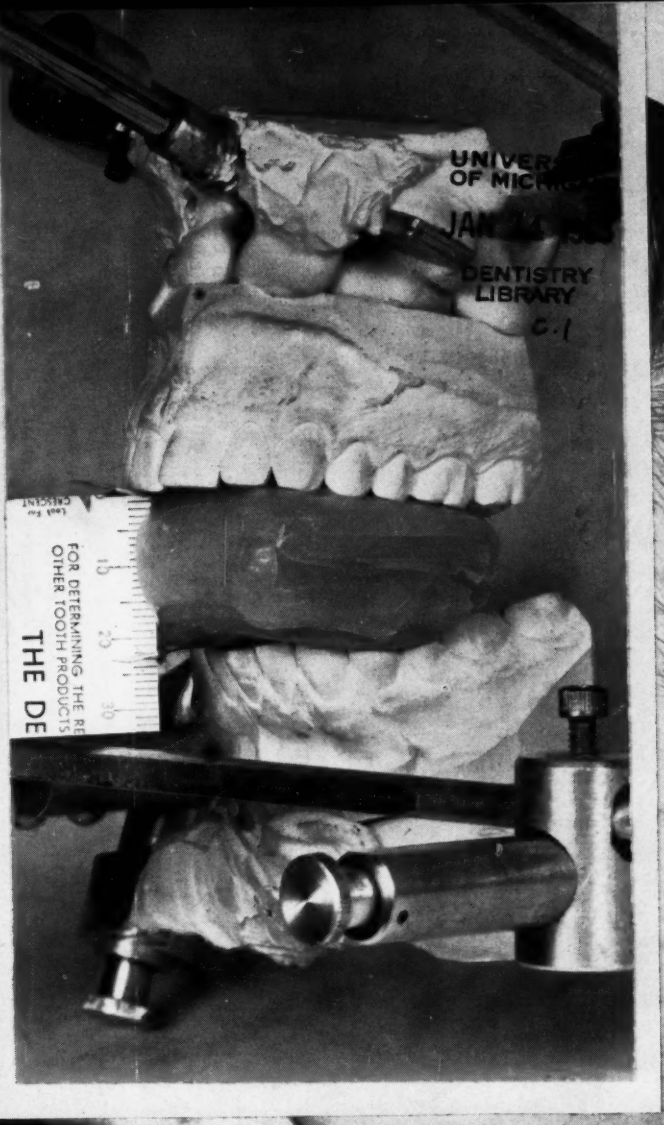

January 1955

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...the "flexibility factor" in the selection and arrangement of Five Phase Anteriors.

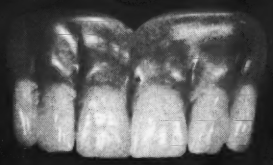

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Fig. 1

Fig. 2

Fig 3

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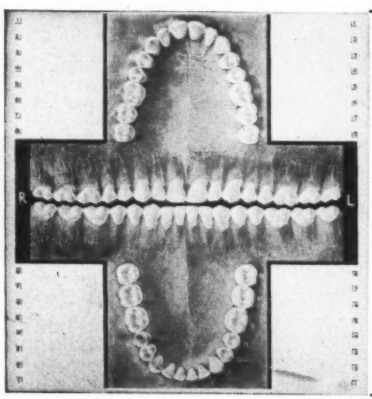

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About Our CONTRIBUTORS

SAM CARTIN, D.D.S. (Ohio State University, College of Dentistry, 1934) is engaged in the practice of oral surgery and exodontia and has contributed extensively to the literature on these subjects. In his article this month, ROOT CANAL CURETTAGE—A REVIEW OF 1000 CASES, Doctor Cartin gives a step-by-step description of his technique.

E. AUBER PEEBLES, D.D.S. (Ohio Dental College, 1892) is an oral surgeon who has made a study of anesthesia, in particular the administration of sodium pentothal in the dental office. Doctor Peebles' article in the current issue, SIMPLIFYING THE ADMINISTRATION OF SODIUM PENTOTHAL FOR INTRAVENOUS ANESTHESIA, describes in detail his method.

HARRY L. PAGE was educated at Hotchkiss and Yale and is well known to DIGEST readers for his highly individual and authoritative articles on various aspects of prosthetics to which he has devoted many years of study. In this issue Mr. Page presents LEXICOGRAPHY, HINGE OPENING, HINGE CLOSING, AND CENTRIC.

MURRAY N. RUBINSTEIN, D.D.S. (New York University, College of Dentistry, 1924), a general practitioner who specializes in restorative dentistry, will be remembered for the numerous articles on this subject that he has published in DIGEST. In this issue Doctor Rubinstein presents the first in a series of five articles, APPROACH TO MOUTH RECONSTRUCTION.

EDWARD J. RYAN, B.S., D.D.S., Editor
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ROOT CANAL *Curettage—*

a Review of 1000 Cases

SAMUEL CARTIN, D.D.S., Toledo, Ohio

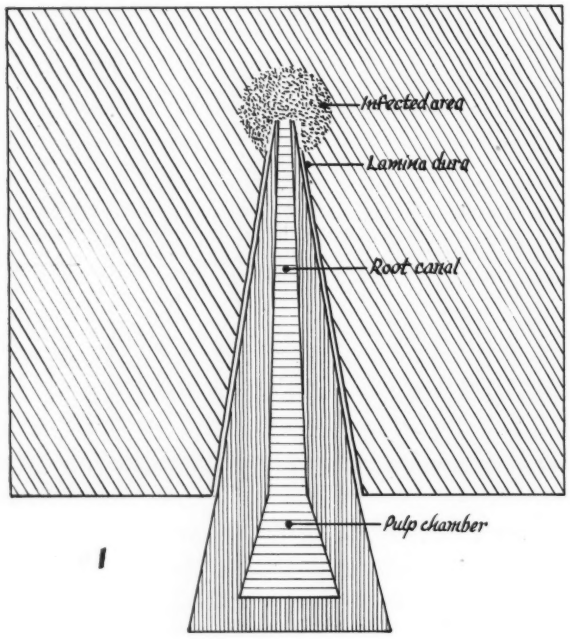
DIGEST

The root canal technique described in this article favors apical curettage and emphasizes mechanical cleaning of the canal with reamers, files, and irrigating solutions. This article is the outcome of a study of more than one thousand cases successfully treated by the method described in patients ranging from six to 65 years of age. Step-by-step directions are given for the procedure employed and all the instruments and materials required to complete the technique are listed.

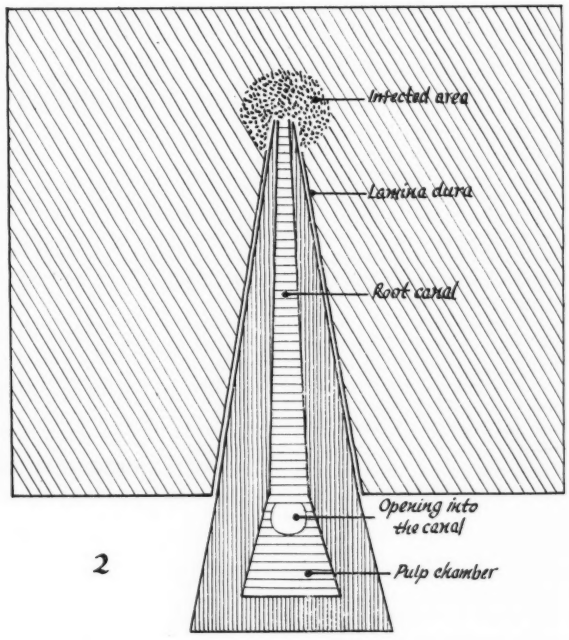
Advantages of Procedure

Apical curettage is the procedure of choice in root canal surgery for the following reasons:

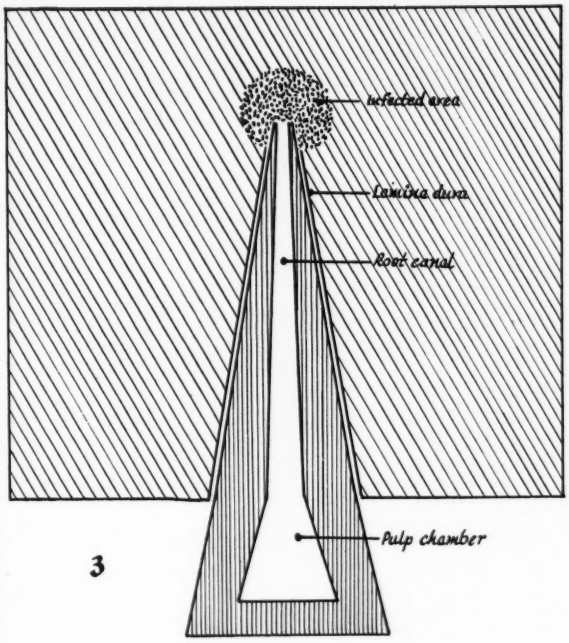
1. Sealing of the apical opening of the root is assured.
2. Filling of the accessory canals is assured.
3. Removal of the excess filling material is assured.
4. Removal of the infected apical tissue is assured.
5. Regeneration of bone around the apex of the root is assured.
6. The length of the root is maintained.
7. The procedure is not complicated.
8. The technique does not require unusual medication.



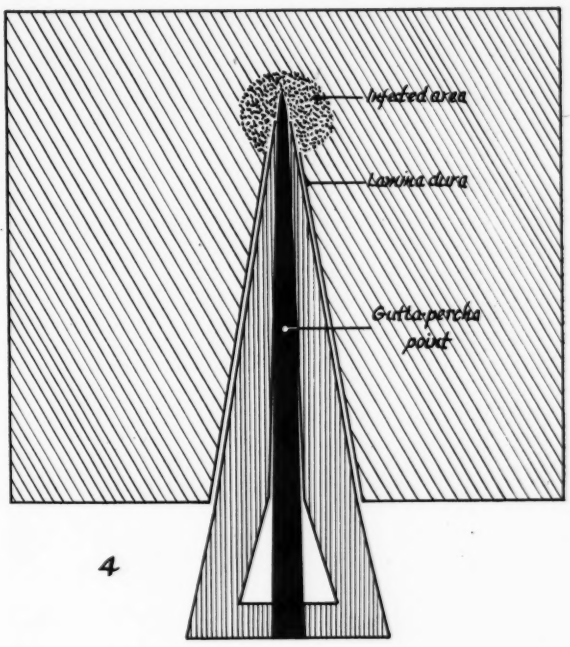
1. *First visit; preoperative x-ray.*



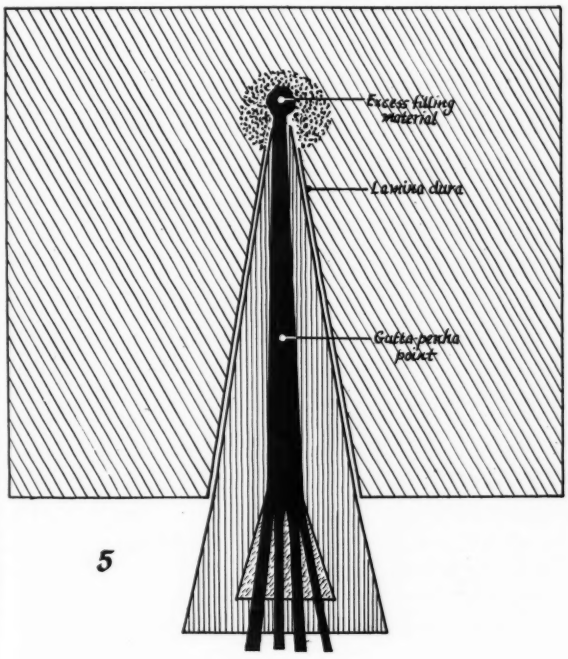
2. *First visit. Opening into the canal. Round hole entering the pulp chamber just above the cingulum.*



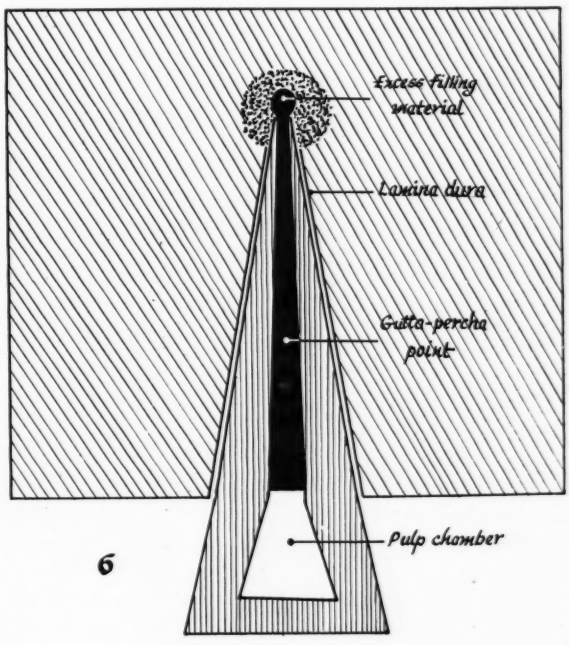
3. *First visit. Outline of the cavity. Triangular shaped opening is made into the pulp chamber, permitting the removal of the contents of the pulp chamber and the pulp canal.*



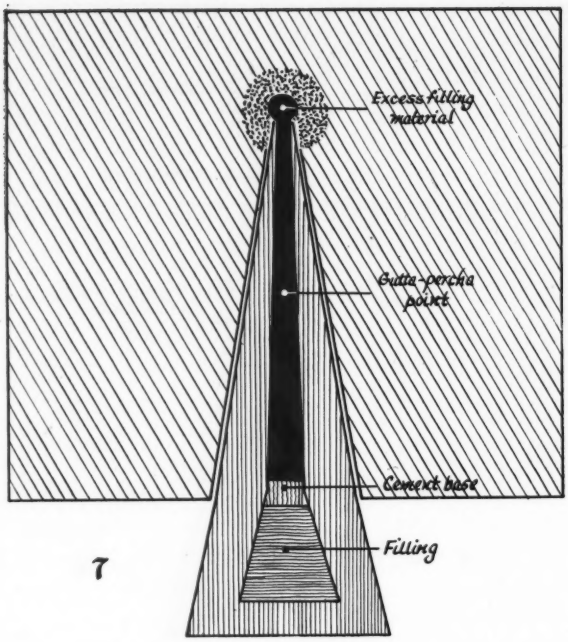
4. *Second visit. Gutta-percha point measured in the canal.*



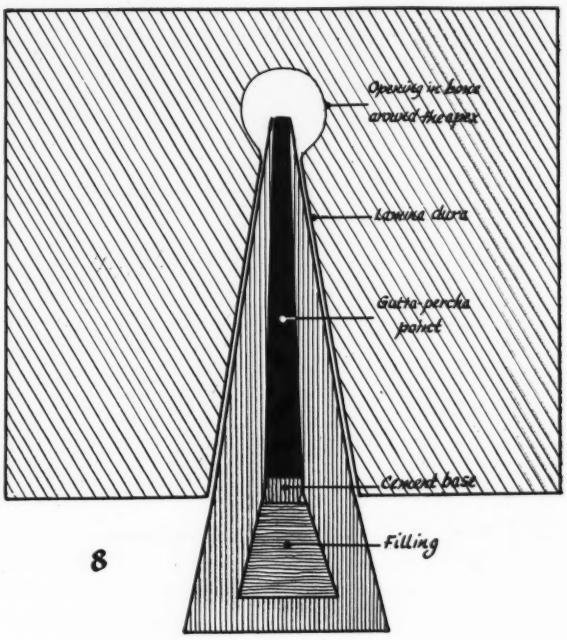
5. *Third visit. Canal filled with sealing paste and many gutta-percha points.*



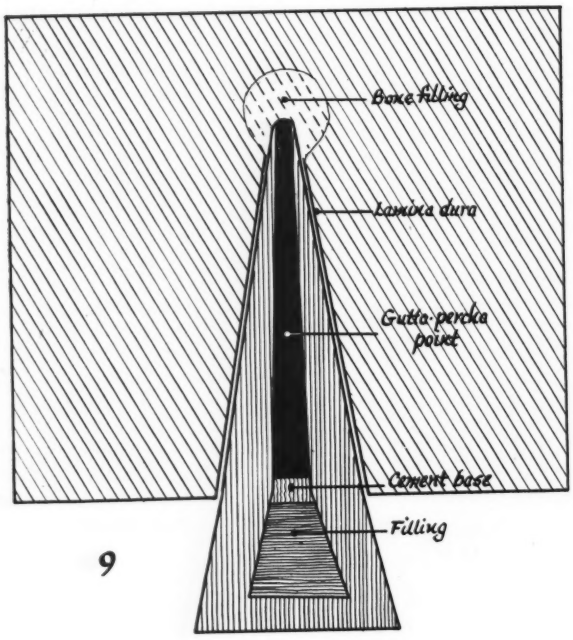
6. *Third visit. Pulp chamber cleaned of excess filling material to entrance of pulp canal.*



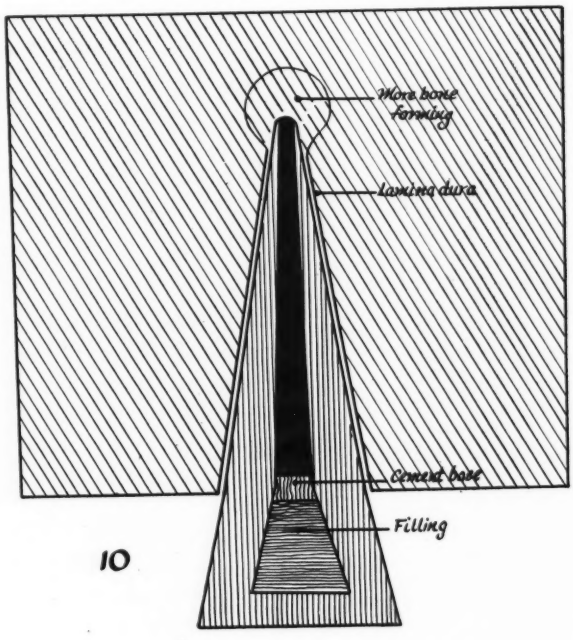
7. *Third visit. Cement base and filling inserted previous to completing the periapical curettage.*



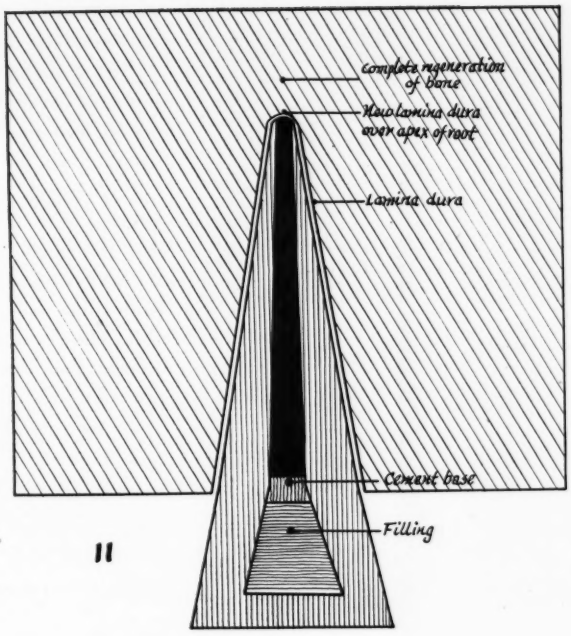
8. *Third visit. Periapical curettage. Excess filling material and infected tissue removed.*



9. *Three-month postoperative x-ray. Bone is starting to regenerate in the area of the periapical curettage.*



10. *Six-month postoperative x-ray. Partial regeneration of bone in the area of the periapical curettage.*



11. ***One-year postoperative x-ray. Complete regeneration of bone in the area of the periapical curettage. Often new lamina dura may be seen over the apex of the root.***

9. The rubber dam is unnecessary.

10. The technique may be completed in one, two, or three visits.

Adaptation of Technique — The technique is limited to single rooted teeth and the double rooted bicuspids. The three-visit technique may be reduced to a two-visit or even a one-visit technique, depending upon the desire of the dentist and the prevailing conditions.

Acute Symptoms Treated—When acute symptoms are present, the tooth is opened through the lingual for drainage with suitable diamond stones. Six hundred thousand units of penicillin G in aqueous suspension is administered intramuscularly. The acute symptoms usually subside within 48 hours. If necessary, penicillin may be repeated after twenty-four hours. When the acute symptoms have subsided, the following three-visit technique is started.

First Visit

At the first visit the following steps are taken:

1. A mouth prop is inserted.

2. The tooth is isolated with cotton rolls. A saliva ejector is used to keep the mouth dry.

3. The tooth is opened through the lingual with a diamond stone.

4. Fissure burs are used to enlarge the opening to form a triangle. The base is parallel to the incisal edge. The apex of the triangle points toward the root. By so doing, the entire pulp chamber can be easily cleaned which helps to prevent discoloration of the crown.

5. A flame bur is used to enlarge the opening into the canal.

6. Reamers and files are used to remove the contents of the canal as well as to enlarge it.

7. From time to time 3 cubic centimeters of hydrogen dioxide is used to irrigate the canal. The foaming action forces out the debris. A paper point inserted into the canal will pick up the loose debris.

8. A final irrigation of 3 cubic centimeters of hydrogen dioxide followed by 3 cubic centimeters of chlorine solution is made. (Two ounces of zonite in 8 ounces or less of distilled water which has been boiled.) The chlorine solution neutralizes the hydrogen dioxide.

9. The canal is dried with paper points and air.

10. A paper point impregnated with cresatin is sealed in the canal with gutta-percha.

Second Visit

Three days later the patient makes his second visit. At this time the following steps are completed:

1. A mouth prop is inserted. The tooth is isolated and dried. The gutta-percha and paper point are removed.

2. Reamers and files are used to enlarge the canal. From time to time the canal is irrigated with 3 cubic centimeters of hydrogen dioxide followed by 3 cubic centimeters of chlorine solution.

3. The largest possible sterile gutta-percha point is inserted into the canal until the apex is reached. An x-ray is taken to confirm this.

4. The gutta-percha point is removed and washed with hydrogen dioxide and chlorine solution to remove the blood and debris. The point is dried and stored in a small jar containing zephiran solution.

5. The canal is irrigated with 3 cubic centimeters of chlorine solution. The canal is dried with paper points and air.

6. A paper point impregnated with monochlorophenol is placed into the canal and sealed with gutta-percha.

Third Visit: Filling the Canal

Preparatory Measures—Three days after the second visit the patient returns. The following procedure is completed:

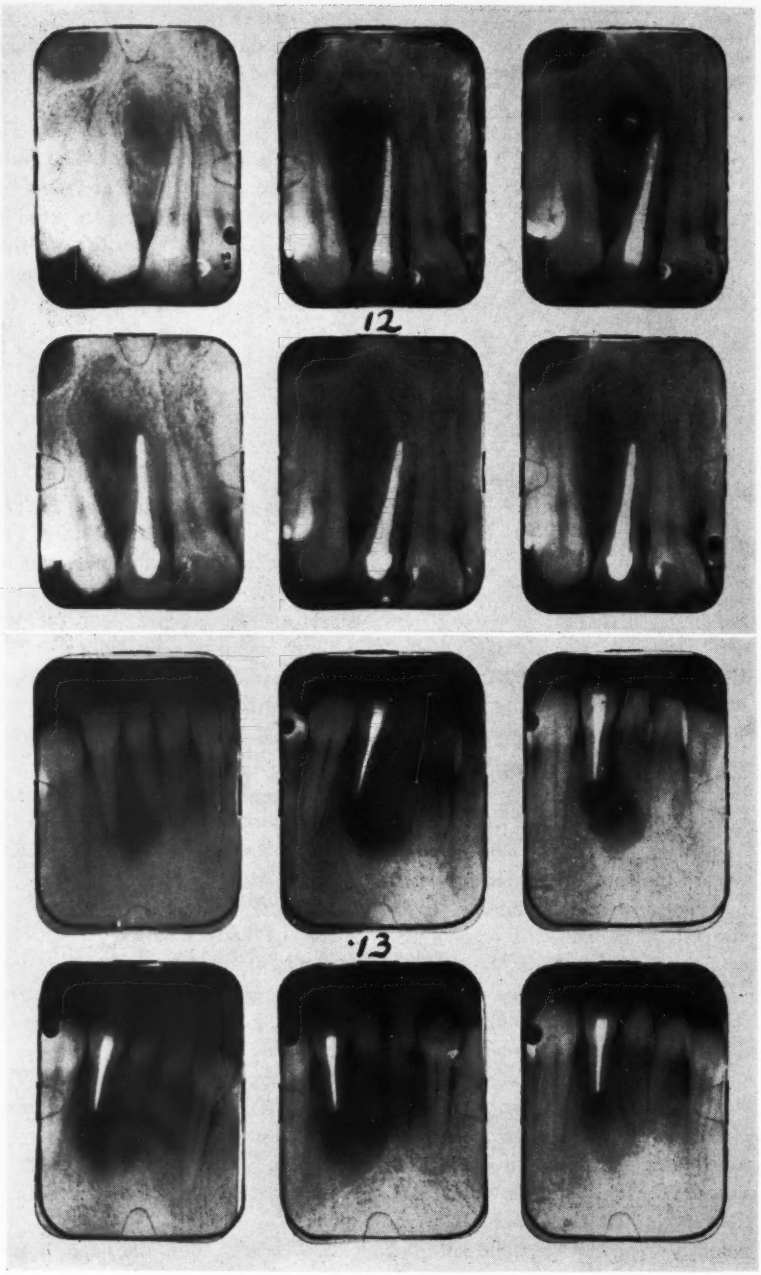
1. A mouth prop is inserted. The tooth is isolated and dried. The gutta-percha and paper point are removed.

2. The canal is irrigated with 3 cubic centimeters of hydrogen dioxide.

3. Reamers, files, and paper points are used to remove the debris. The canal is irrigated with 3 cubic centimeters of hydrogen dioxide followed by 3 cubic centimeters of chlorine solution.

4. Paper points and air are used to dry the canal.

5. A paper point impregnated with phenol is inserted into the canal and allowed to remain for a minute. It is removed and another paper point impregnated with 70 per cent grain alcohol is inserted and allowed to remain for a minute.



12. ***Upper left central; 2-visit technique; bone regeneration.***
13. ***Lower left lateral; 3-visit technique; bone regeneration.***

6. The paper point is removed and the canal is dried with paper points and air.

Filling Technique—Just before the preparatory procedure was started the measured gutta-percha point and 6 additional points were placed in 70 per cent alcohol for a few minutes and then allowed to dry. This was to make certain that sufficient gutta-percha points would be available to completely fill the canal. The following steps are taken:

1. On a sterile glass slab the filling paste is prepared by mixing the powder (2 parts thymol iodide, 1 part bismuth subnitrate, 4 parts zinc oxide) with the liquid (1 part eugenol, 1 part formocresol). The measured point is covered with paste and inserted into the canal. A spreader is used to push the point to one side.

2. A second gutta-percha point is covered with the paste and inserted into the canal. This is repeated until the canal is completely filled. The protruding ends are cut off.

3. The points are then firmly packed into the canal with suitable pluggers.

4. An x-ray is taken to make certain the canal is properly filled.

5. While waiting for the x-ray to be developed the pulp chamber is cleaned down to the opening of the canal.

6. The pulp chamber is sterilized with phenol followed by 70 per cent grain alcohol and then air-dried.

7. If the x-ray shows the canal to be properly filled, a cement base is inserted. The remainder of the pulp chamber is filled with any desired filling material.

Third Visit: Curettage

Procedure—1. Under infiltration anesthesia a suitable flap is retracted.

2. An opening is made into the labial bone directly above the apex of the tooth. The opening is enlarged to expose the apex of the root, the infected area and the excess filling material.

3. The infected tissue and the excess filling material are removed with a double ended Number 9 excavator, used as a curette. The root is not disturbed.

4. The apex of the root is smoothed with a diamond stone. A suction tip is used to remove the debris. The area is allowed to fill with blood.

5. An x-ray is taken to make certain that the surgery has been properly completed.

6. The flap is replaced and held in position with silk sutures.

Final Measures—(1) The patient is instructed to apply finger pressure on top of the lip should there be excessive hemorrhage.

(2) An ice-bag may be applied to

the face at intervals (15 minutes on and 15 minutes off) for a few hours.

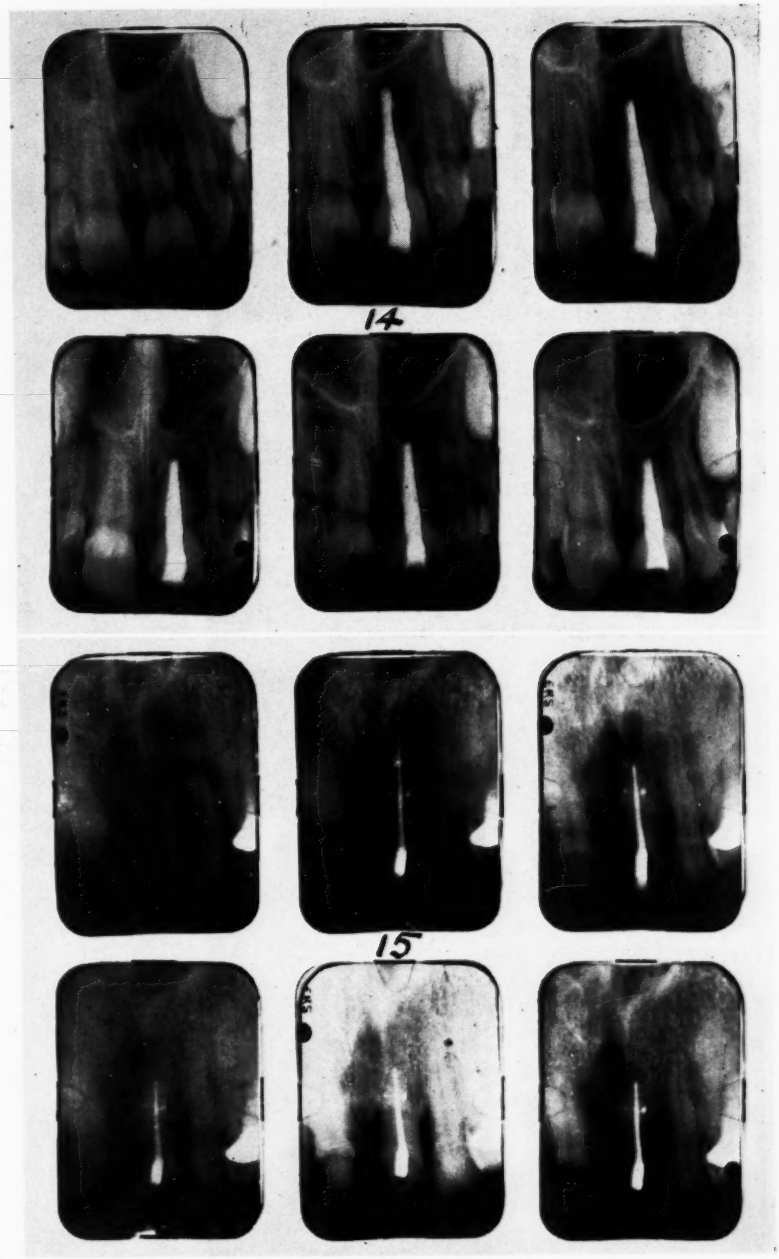
(3) The patient is given a number of analgesic tablets to be taken as directed. A sedative may be taken at bed time with an analgesic tablet.

(4) The sutures are removed in one week.

(5) Postoperative x-rays are taken for a year at intervals of three months to observe the regeneration of bone around the apex.

Armamentarium

1. To open the canal:
   diamond stones
   fissure burs
   flame burs
2. To clean the canal and pulp chamber:
   excavators Numbers 17 and 18
   reamers
   files
   paper points
   cotton pellets
   3-cubic centimeter all glass syringe
   number 20-gauge needle, 4 inches long with the tip blunted
   irrigating fluids
   hydrogen dioxide, 4 ounces
   chlorine solution, 4 ounces
3. Drugs:
   cresatin
   monochlorophenol
   phenol
   70 per cent grain alcohol
   600,000 units procaine penicillin G
   zephiran
4. Filling material:
   assorted gutta-percha points
   sealer: powder 4 ounces, (1 part bismuth subnitrate, 2 parts thymol iodide, 4 parts zinc oxide). Liquid: ½ ounce, (1 part eugenol, 1 part formocresol)
   suitable filling material such as cement, plastic, and silicate
5. Filling instruments:
   Kerr's spreaders and pluggers
6. Instruments for the curettage:
   Feldman bibevel drill, Number B
   fissure burs
   diamond stones (cylinder shaped)
   Bard-Parker knife with the Number 15 blade
   half round needles with silk sutures
   periosteal elevator Number 9
   hemostat
   scissors
   excavator, Number 9, double ended

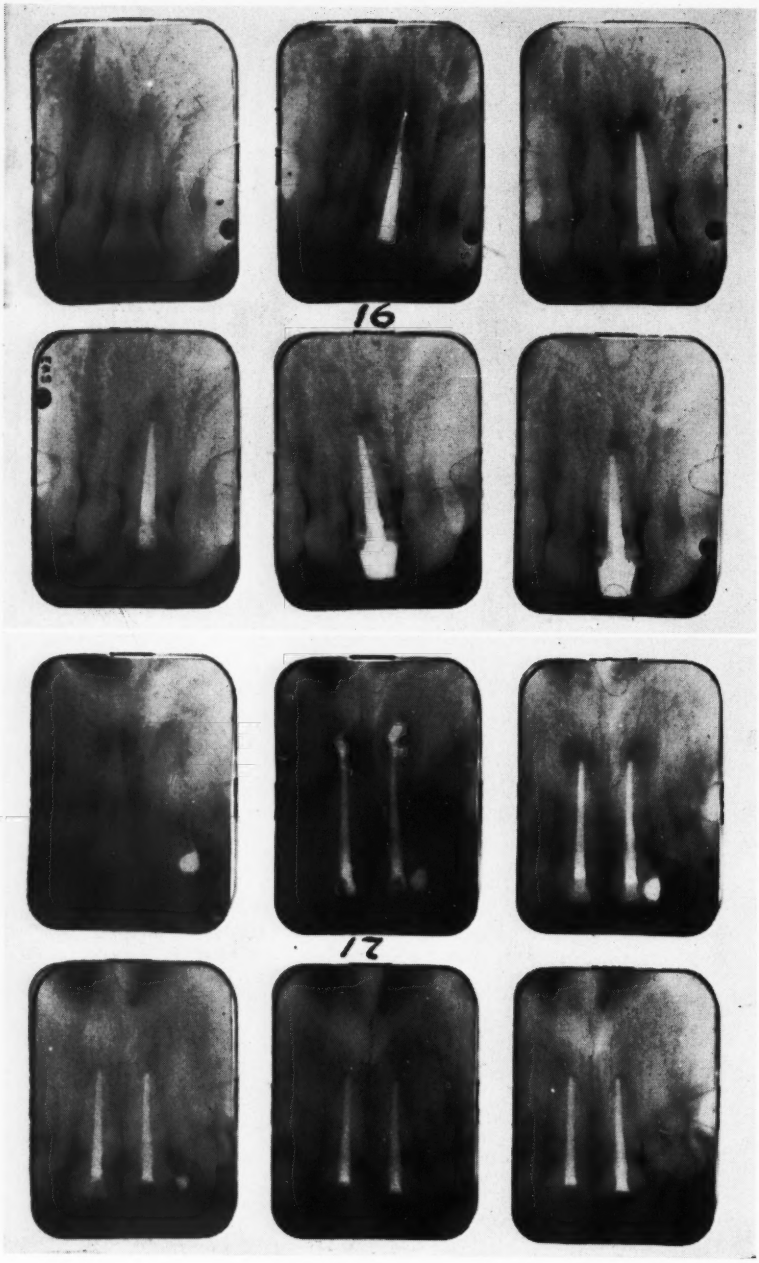


14. ***Upper left central; 1-visit technique; bone regeneration.***
15. ***Upper right central; 3-visit technique; accessory canals.***

Summary

1. A root canal technique has been described favoring apical curettage. The procedure may be changed to suit individual requirements.

2. Emphasis has been placed upon the mechanical cleaning of the canal by means of reamers, files, and the use



16. ***Upper left central; 1-visit technique; bone regeneration showing lamina dura.***

17. ***Upper right central and upper left central; 3-visit technique; bone regeneration.***

of irrigating solutions in the canal.

3. For sterilizing the canal mild drugs are used.

4. Acute symptoms are reduced by opening into the canal for drainage and administering 600,000 units of penicillin.

5. The canal must be completely filled with gutta-percha and a suitable sealing paste.

6. The excess filling material and the infected tissue are removed by means of an apical curettage.

7. Postoperative x-rays are taken at the end of three months, at the end of six months, and at the end of one year to observe the regeneration of bone around the apex of the root. Often new lamina dura have been seen on these examinations.

8. This article is a review of over 1000 cases successfully treated by the method described. The age of the patients ranged between six years and sixty-five years. The technique merits consideration as a practical office procedure.

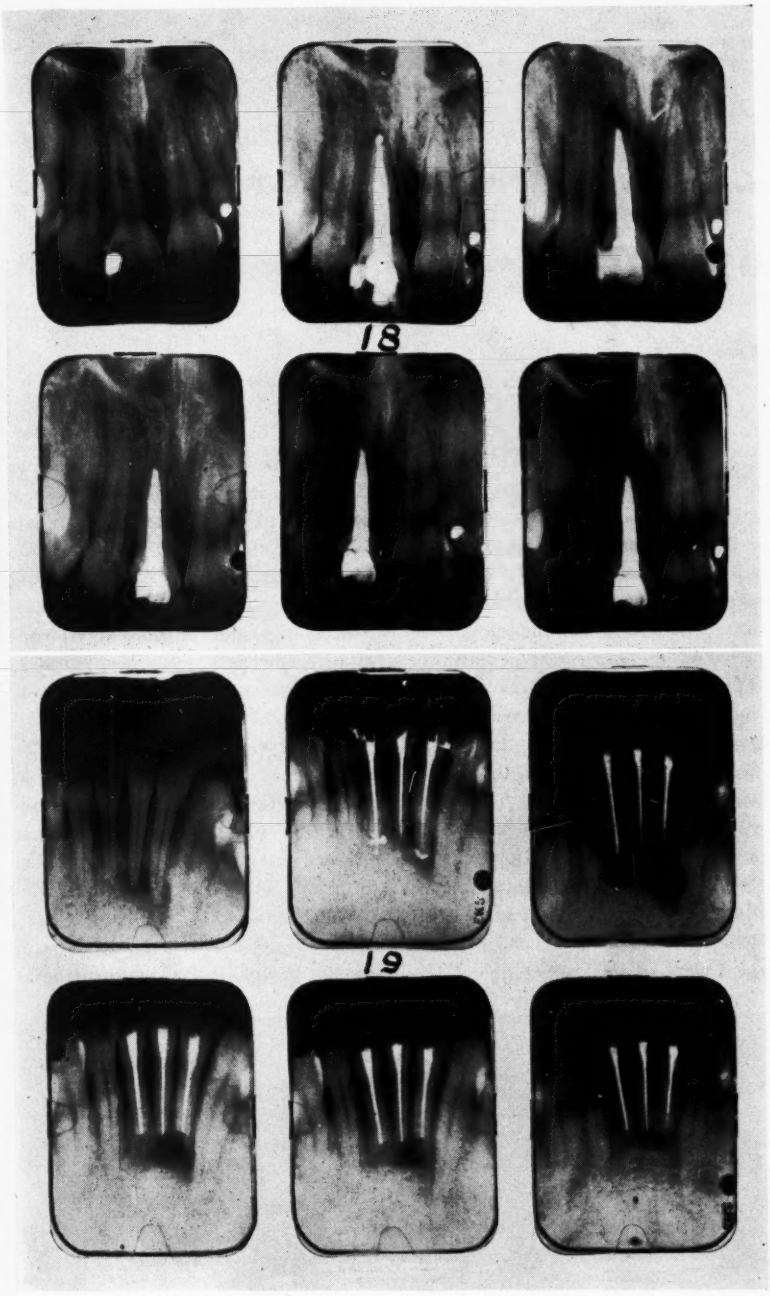
Special note: Illustrations for Figs. 18 and 19 of the Doctor Cartin article appear on opposite page.

515 *Madison Street.*

The Object of Medicine

THE ADAPTIVE processes operate within wide limits with the body in a state of well-being, able to perform its accustomed functions, and presenting no unusual changes on examination. On the other hand, the adaptive process, and the same holds true of processes of differentiation, may become unbalanced and a state will result which, if continued, will result in unusual feelings in the subject, impairment of accustomed functions, and, perhaps, structural, demonstrable changes in the body structure. This state of unbalance is by common consent called *disease*. Between these two states is a zone which is neither one nor the other. Adaptation or differentiation has passed beyond what is readily accepted as physiologic and yet it cannot be considered pathologic. To the mind trained in thinking in terms of static patterns this is most disturbing, but it is entirely consistent with a concept of adaptive processes. The object of medicine is not to define disease and prescribe the cure, but to understand the interplay of forces within the body and to learn to influence them so that they will remain within the bounds of health.

From *Modern Concepts in Medicine by Julius Jensen, The C. V. Mosby Company*, 1953, *p.* 57.



18. ***Upper left central; 2-visit technique; bone regeneration showing lamina dura.***

19. ***Lower centrals and lower right lateral; 6-visit technique; bone regeneration.***

The Ultrasonic Principle in Dental Application

CAVITIES have been prepared with ultrasonic instruments. The electrically induced vibrations from ultrasonic devices are too rapid (29,000 vibrations *a second*) and too high pitched for the human ear to hear. These ultrasonic vibrations are imparted to abrasive aluminum oxide particles that are suspended in liquid. The vibrating head of the instrument acts as a mallet to drive the abrasive particles into the tooth structure. To carry through the analogy, the abrasive particles act as tiny chisels to break down the hard dental tissues at great speeds.

There are no dangers to the *soft* tissues when operating with ultrasonic instruments.

Chemicals in the Cure of Cancer

IN THE past, effort has been concentrated largely on trying to determine the forces that give rise to the cancer cell and permit its destructive growth. Previously, cure by chemicals had been regarded as impossible. A recent report from the Sloan-Kettering Institute for Cancer Research, however, announces that chemicals have been found which can cure regularly tumors transplanted in animals. The proof that chemicals can cure some types of animal cancer—as effectively as surgical removal—is considered by research scientists one of the most important milestones yet achieved in cancer control.

From *Cancer Bulletin* **6**:122 (*Sept. - Oct.*) 1954.

Simplifying the Administration of SODIUM PENTOTHAL *for Intravenous Anesthesia*

E. AUBER PEEBLES, D.D.S., Los Angeles

DIGEST

This short article contains some important suggestions for the use of sodium pentothal anesthesia in the dental office.

Preparation of Solution

A 2 per cent solution of sodium pentothal is prepared by adding 1 gram of sodium pentothal to 50 cubic centimeters of distilled water. For those who do not have occasion to use this type of anesthesia frequently, 2 grams of sodium pentothal to 100 cubic centimeters of distilled water makes an amount sufficient for one day's use. It is not advisable to use the same solution after twenty-four hours.

Technique

Position of Patient—When placing the patient in the dental chair the back of the chair should be tilted so that the patient is in a slightly reclining position as shown in Figure 1. This, with the aid of the adjustable chair arm, makes for a satisfactory position of the patient's arm and antecubital area.

Round Object Placed in Hand—It is well to have a round article in the patient's hand to prevent the clenched fingers from irritating (with the finger nails) the palm of the hand.

To Prevent Irritation of Surrounding Tissue—As shown in Figure 1, there is a small glass tube which intersects the rubber tubing; when the vein is entered, this exhibits a flow of blood. When blood is not present in the tube, remove the needle and do not allow the solution to enter the muscle or soft tissue which might cause marked inflammation of the surrounding tissue.

Method of Induction—1. When the vein is entered, 1 or 2 cubic centimeters of the solution may be injected intermittently, as needed, to produce anesthesia.

2. If there should be any embarrassment of the respiration, oxygen with 5 or 10 per cent CO_2 may be administered, either with a nitrous oxide-oxygen implement, or, as some anesthetists prefer, oxygen with 5 or 10 per cent CO_2 delivered from a cylinder placed behind the chair which may be held in a saddle made for the purpose with a tube leading to a small nasal inhaler.

3. If the sodium pentothal is administered slowly, a noticeable lowering of the blood pressure may never occur.

Postanesthetic Measures—(1) The patient may be permitted to remain in the dental chair until complete recovery, or (2) he may be taken in a wheeled chair to the recovery room to remain until fully recovered from the anesthetic.

2505 *West Sixth Street.*

Patient in proper position in dental chair for the administration of sodium pentothal intravenous anesthetic.

Lexicography, Hinge Opening, Hinge Closing, and Centric

HARRY L. PAGE, Valparaiso, Indiana

DIGEST

The prerogatives of a lexicographer are summarized herein and a serious case of erroneous dental lexicography is analyzed. The differences between "hinge opening position" and hinge closing position of the condyles are compared. The dangers of reliance upon centric relation are portrayed diagrammatically and explained.

Definition

Hinge opening position:[1] "The position of the condyle in the temporomandibular joint from which an opening by hinge movement is possible beyond the amplitude of the rest position was defined as a hinge position. The position is the most retruded position of which the condyle is capable. The conditioned movement voluntarily achieved from this position was defined because, although nonfunctional, it is employed by certain prosthodontists in the construction of dentures."

Function of Lexicographer — The prerogatives of a lexicographer do not include the right of subjective definition or judgment. His duties are those of an historian, who notes acknowledged scholastic or scientific application of meaning to a word, term, or phrase and how generally the meaning was accepted. If sufficiently important in these respects, a new word, term, or phrase is approved for publication or a familiar one is assigned a new meaning. Sometimes a word or term originates in disrepute (slang or worse) and achieves dignity by popular usage. In neither case is the lexicographer an authority, sponsor, or critic; he is merely a reporter.

Misconception—"Hinge Opening Position" has been published in the *Journal of the American Dental Association* as the studied title and definition of an official lexicon committee. The term will be internationally quoted as authoritative because the defining committee is supposed to be above question. The committee's influence will spread widely and will continue for a long time. This is unfortunate for *"Hinge Opening Position" is a misconception from the first word of the title to the final period of the definition and explanation.*

Meaning Arbitrarily Applied—The nomenclature committee seems unaware of its obligation to consult proper and authoritative sources for its title and definition. It should have made sure it understood and then published the exact meaning and purpose intended by the acknowledged originators and sponsors of the hinge-axis concept.

Origin of Term—The Gnathological Society of California first applied the ancient and universally understood functional control center (hinge-axis) to the kinematics of human articulation. Other groups recognized its worth and adopted it. None among them, however, considered the hinge-axis a significant component of the *opening* stroke.

Important Stroke in Articulation—The accepted leader of the hinge-axis group, Beverly B. McCollum,[2] stated tersely, "We may literally let our mouth drop open." While the jaw *can open* as well as close with the condyles in hinge position, it seldom does so. That it does not use a "Hinge Opening Position" in function is immaterial. In articulating teeth, the important stroke to be captured and duplicated is the one governed by the natural or functional hinge *closing.*

Important Functional Control—When the wheel was discovered and put into use, the hinge position of the axle and its hinge-axis came into being automatically. Since that prehistoric moment and down through all the thousands of ensuing years, this hinge position of the axle and its hinge-axis have been recognized and casually taken for granted by every science as the fundamental and most important of all *functional* controls. Far from being "nonfunctional," the hinge-axis *controls* function.

Some Functions of Hinge Axis—It governs the constant sagittal plane third dimension so indispensable to every mechanism (including the jaw) that engages in arcing, circular, or rotary motion. Without it, these motions would have no functional stability and, hence, no value. It controls the function of all machinery. It governs the functional arc scribed by a fingertip when a finger is crooked. The punting fullback's toe swings accurately against a football only because a hinge-axis dictates the functional arc travelled by his shoe. Without a hinge-

[1]Report of the official Nomenclature Committee Meeting June 20th and 21st, 1952; JADA **46**:327 (March) 1953.

[2]McCollum, B. B.: Fundamentals Involved in Prescribing Restorative Dental Remedies, *Dental Items of Interest*, a 1941 reprint; page 7.

axis operating as a functional control center, he might butt the ball with his shin or kick himself in the ankle.

Used in Natural Reconstruction—That the human jaw functions as a hinge was known among medical physiologists[3] before the twentieth century. A practical method of locating the hinge-axes was given to dentistry over a quarter of a century ago (1926) by Beverly B. McCollum of Los Angeles. He and his followers throughout the country have been using hinge-axes ever since in reconstructing mouths of *natural* teeth far more than have prosthodontists. Harvey Stallard of San Diego has used hinge-axes consistently in orthodontia the same length of time.

Tardy Discovery by Prosthodontists—To speak of including "Hinge Opening Position" in dental nomenclature because "it is employed by certain prosthodontists in the construction of dentures" shows little acquaintance with the hinge-axis origin, history or use. Prosthodontists have been the *last* to discover and are only just beginning to appreciate hinge-axes.

Physiologic Factors Demonstrated

In a previous article,[4] it was demonstrated that a condylar hinge position and a hinge-axis rarely coincide with a condylar physiologic "rest position." As a rule, the latter lies well below the former. Sometimes the distance between the two will be as much as a quarter of an inch. It was also shown that there are frequent cases where the hinge-axis positions are anterior as well as superior to the "rest position." This means that jaw motion from "rest position" to final occlusion is *not* pure rotary as claimed but is predominently translational motion. It means, too, that a hinge position is not always "the most retruded position of which the condyle is capable."

Rest Position Clarified—Proponents of the "rest position" overlooked the possibility (now proved to be a fact) that the jaw, in assuming rest position, does not *rotate* open to that position with the condyles seated in their fulcral positions against the fossae. Instead, the whole jaw, including the condyles, relaxes with the condyles dropping into the hammock of the capsular ligaments. They must, therefore, return to hinge position against the anterior slopes of the mandibular fossae by translational or bodily motion before pure rotary motion can begin to take place.

Movement from Rest Position Unimportant — Posselt[5] demonstrated both mechanically and roentgenographically that movement from "rest position" to final occlusion was a bodily movement. Ricketts,[6] in a prize-winning article, regretfully impugned his former stand and admitted finding few heads wherein the motion from "rest position" to closure was pure rotary movement. All these findings add up to the fact that movements within "the amplitude of the rest position" have no mechanical value in articulation. They and the physiologic rest position are of interest from an academic standpoint only.

Subject of Controversy — Well-versed operators invariably guide the jaw into hinge position when locating the hinge-axes. Oftentimes considerable force is used against the mandible. The use of this "conditioned movement," to quote the nomenclature committee once more, has been the subject of much controversy. The questions of function versus nonfunction and strained versus unstrained relations are hotly argued. Even the patient joins in with a sometimes plaintive, sometimes belligerent insistence that he "does not chew that way." Actually, he does. All power masticating function involves strain. However, none of these contentions either pro or con have any pertinence in the articulation problem.

Characteristics of Masticating Controls—Like all muscles, the masticating muscles cannot be stretched, especially while they are contracting functionally. None of the contacting tissues of the temporomandibular joint including the meniscus can be compressed or displaced. The temporomandibular ligaments which control the placing and anchorage of the condyles in their fulcral or hinge positions on the anterior slopes of the mandibular fossae, are like tough steel bands. With such mechanisms, all types of relations, functional or nonfunctional, strained or unstrained will be the same when the condyles are in their hinge positions. If only the patient would refrain from thrusting his chin forward he could be allowed to activate his own jaw in finding the hinge-axes. That, unfortunately, is possible only with a well-trained patient. Let us see why.

Analysis of Chewing Mechanism—Whenever anything that resembles food is offered the human mouth, or a patient is asked to bite something voluntarily, a protrusion almost always results. The reason is obscure but may stem from an impulse millions of years old to snap up the food quickly lest some other animal seize it first. Once the morsel is safely within the mouth, however, and is set for chewing, the patient will eliminate the exasperating protrusion and will close naturally upon his back teeth. With or without food in the mouth, it is this natural, involuntary closing stroke (not the opening stroke) that gives the desired functional condylar hinge position and the jaw motion that revolves around the hinge-axes. To capture them for use in an articulator, the protrusion that accompanies *voluntary* jaw motion must be counteracted artificially by a "conditioned movement." Let it be repeated that no questions of function or nonfunction, of strained or unstrained relations need be considered for none are involved.

Meaning of Kinematics — There seems to be an inordinate amount of confusion over the difference between the hinge-axes concept and the centric relation concept. Even among a few of those who use hinge-axes there is an almost apprehensive reluctance to abandon centric relation. It is often argued that there is no difference be-

[3]Schenck, F., and Gurber, A.: Human Physiology, ed. 2, Zoethout. 1901, p. 203.

[4]Page, Harry L.: Maxillomandibular Terminal Relationships, DENTAL DIGEST **57**:492 (November) 1951.

[5]Posselt, Ulf: Studies in the Mobility of the Human Mandible; Acta Odontologica Scandinavica, Volumen 10, Supplementum 10, 1952; pp. 134 and 114.

[6]Ricketts, Robert Murray: A Study of Changes in Temporomandibular Relations Associated with the Treatment of Class II malocclusion; *Am. J. Orthodon.* **38**:918-933 (Dec.) 1952.

tween the concepts; that it is a mere juggling of terminology. How can this possibly be so? *Articulation is kinematics. Kinematics is motion. Motion is function.* To be useful, functional articulation movements must be governed by kinematic control centers; that is, hinge-axes.

Functional Third Dimension Provided—Kinematic control centers are necessary to provide a functionally constant third dimension in the sagittal plane, one that will be unaffected by changes in jaw opening or closure. The arc through which any given point on the mandible moves when the opening is changed by function must remain equidistant from the control centers (hinge-axes) at all times *during final, natural closure.* Otherwise, the movement will not only be aimless but also harmful to the teeth.

Kinematics vs. Statics—Centric, centric relation and/or centric occlusion involve no kinematics; they involve statics only, the exact opposite of kinematics. They neither exercise nor need any control because they do nothing, perform no movement or function. Centric concepts are based and are wholly dependent upon an unchanging, a stationary third dimension. In dentistry, this is called the "vertical dimension." As is universally acknowledged, it must not be altered; it must remain motionless.

Problem of Articulation Defined—But, the articulation problem is not one of maintaining a static vertical dimension; it involves action and the control of complicated surfaces (cusp teeth) during functional motion *so that these complicated surfaces will clear one another while moving toward and into occlusion terminating at that vertical dimension.* A fullback's problem is not one of touching the ball to the ground behind his opponent's goal; it is one of *dodging all opposing tacklers until he can reach that goal.*

Centric Relation Superflous

Lucia[7] stated, "Without an axis mounting . . . you cannot check or prove a centric relation record," and, conversely, "A hinge axis mounting makes possible the checking or proving of centric relation records." If, as he says, we cannot prove or even record an accurate centric relation without first securing and mounting hinge-axes and since the hinge-axes control centric relation and all correct approaches to it, it is clear that centric relation is superfluous. Only a dead man needs centric relation and then only so his forever motionless features will soothe and please the mourners.

An Untenable Distinction—Some cling to centric relation on the grounds that it is the "terminal hinge position" of the condyles in their fossae. They contend that the hinge-axis is constant to the mandible wherever it goes and, for this reason, a distinction must be made between *a* hinge position and the centric relation or "terminal hinge position." If this were true, there would be no way to record a hinge-axis, a "terminal hinge position" *or* a centric relation.

Closure Arcs Differ—If patients could record hinge-axes with the condyles in *any* position, there would be no possible way to distinguish between an ordinary, useless hinge position and the one necessary and so-called "terminal hinge position." All centric relations, being dependent upon the hinge-axes would, more than ever, be without value. Furthermore, as will be shown later, even with the condyles in *correct* hinge position, closure arcs from centric relation mountings will differ materially from closure arcs controlled by hinge-axes.

Fallacy Demonstrated—In determining and mounting a centric relation, clinicians invariably insist upon a minimum thickness wax bite between the opposing occlusal surfaces. Nor may the occlusals be allowed to reach this minimal separation by biting deeply into a thick wax wafer. Not only must the wafer be thin but also the indentations must be shallow. Therein is demonstrated the complete fallacy of centric relation. The advocacy of a limited occlusal separation and a shallow matrix tacitly acknowledge the vulnerability of the fixed, the stationary jaw position, and the unchanging vertical dimension that are required if centric relation is to have any value. One need only contemplate what happens to the all-important vertical dimension when the wax bite is removed to permit the teeth to come together in the articulator to appreciate this.

No Control Over Articulation Movements—If vertical dimension is so essential to centric relation (and it is) that a technician is criticized for opening the dentures part of a millimeter in processing the edentulous case, why is not the dentist even more guilty of serious error in closing the dentulous rehabilitation case two or even more millimeters from centric relation after mounting in the articulator? Gross prematurities that compel the taking of centric relation at this amount of opening are commonplace. And why are deep bites in thick wax to be shunned even though they produce the accepted interocclusal separation? Can it be other than the fact that centric relation has no control over jaw or articulator movements?

Errors in Closure—When centric relation is used, the arc of closure in the articulator fails to coincide with the mouth arc of closure that made the paths in the wax originally (Figs. 1 and 2). Teeth mounted in the articulator are not being guided correctly through the slips cut in the wax and will drag or refuse to close at all. Cusp tips and inclines, being set up and formed by these same erroneous closure arcs in the articulator will repeat this same interference when the denture is installed in the mouth. This will apply both to full mouth reconstruction of natural teeth and to artificial dentures.

Analysis of Popular Theory

A common contention is that true hinge-axes are not as important as a centric relation bite taken with a minimal occlusal separation and that the latter will produce correct occlusion with no articulatory interferences. It will be worth while to analyze this contention carefully. If it can stand

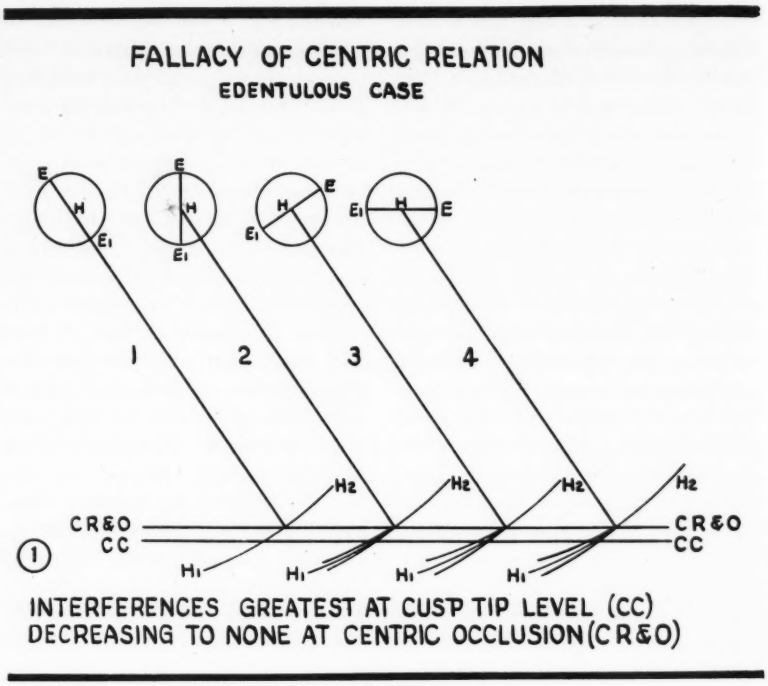
[7]Lucia, Victor O.: The Fundamentals of Oral Physiology and Their Practical Application in the Securing and Reproducing of Records to be Used in Restorative Dentistry, *J. Pros. Dent.* 3:214-215 (March) 1953.

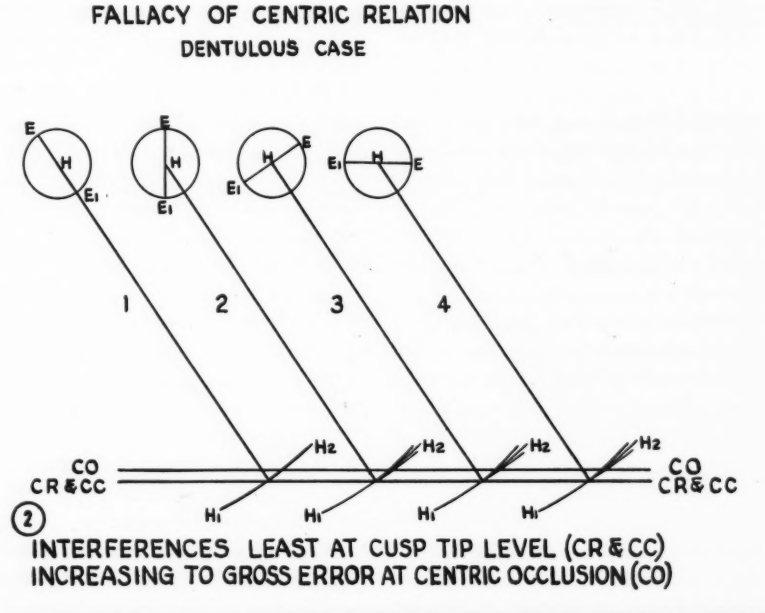
up, it will be equivalent to proof that a circle can have more than one center, something that will certainly be without precedent in mathematics.

Discussion—Figure 1—The paths of tooth travel in the sagittal plane and within the range of interdentation when centric relation has been used to mount an edentulous case are shown. The vertical dimensions being the same, line CR&O represents the centric relation and centric occlusion line of the two simple surfaced occlusion rims with which all edentulous mountings are made. By using this line as a base, any number of occlusions may be diagrammed and studied. Line CC represents the line along which the cusp tips of the teeth will begin to contact when set up. The vertical distance between CR&O and CC has been taken as 2 millimeters. Assuming an average mandibular angle of 125° and 68 millimeters as an average distance from given points on the centric relation and occlusion line to the hinge-axis, H; diagonals 1, 2, 3 and 4 corresponding to rami for each diagrammatic study have been erected.

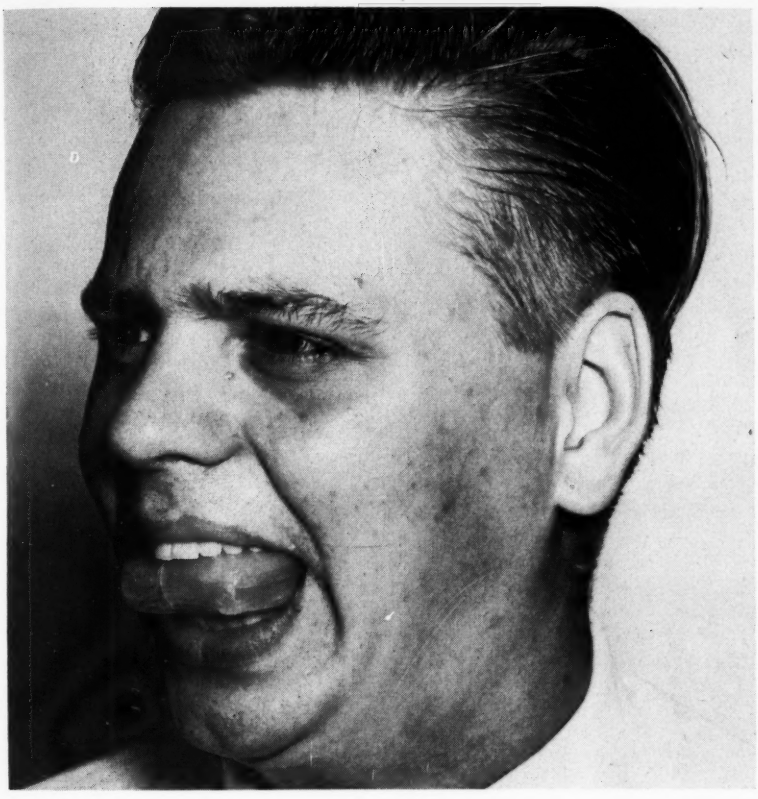
Incorrect Centers Located—Using H as a common center and a radius of 6 millimeters to represent the average error between the true hinge-axis and the arbitrary jaw rotational center that results from using centric relation, circles have been scribed at the end of each diagonal. By swinging the diameters consecutively in each of these circles 45° at a time, erroneous centers, E and E_1 have been located in all major directions 6 millimeters from the true hinge-axis, H. With E and E_1 as centers and radii extending from E and E_1 to the four identical occlusion points on CR&O, representative paths of tooth travel or closure arcs while under the control of these erroneous centers have been scribed. Finally, with the true hinge-axis, H, as a common center the correct arc of closure, H_1 H_2 has been scribed for all four studies.

Closure Arcs Diverge—Examination of numbers 2, 3 and 4 shows that only trouble can be expected from these centric relation mountings. The closure arcs controlled by E and E_1 diverge materially from H_1H_2 in each case. Number 1 indicates that it may be possible to "get by" if the erroneous centers happen to be situated on a line that passes through *both* the occlusion point and H. However, the chances are three to one against such a happy error.





Discussion—Figure 2—The paths of tooth travel in the saggital plane and within the range of interdentation when centric relation has been used to mount a dentulous case are shown. Here, the vertical dimension of centric relation and centric occlusion are not the same for cusps must not be allowed to contact through the wax lest the accuracy of the centric relation bite be destroyed. Therefore, CR&CC represents the centric relation



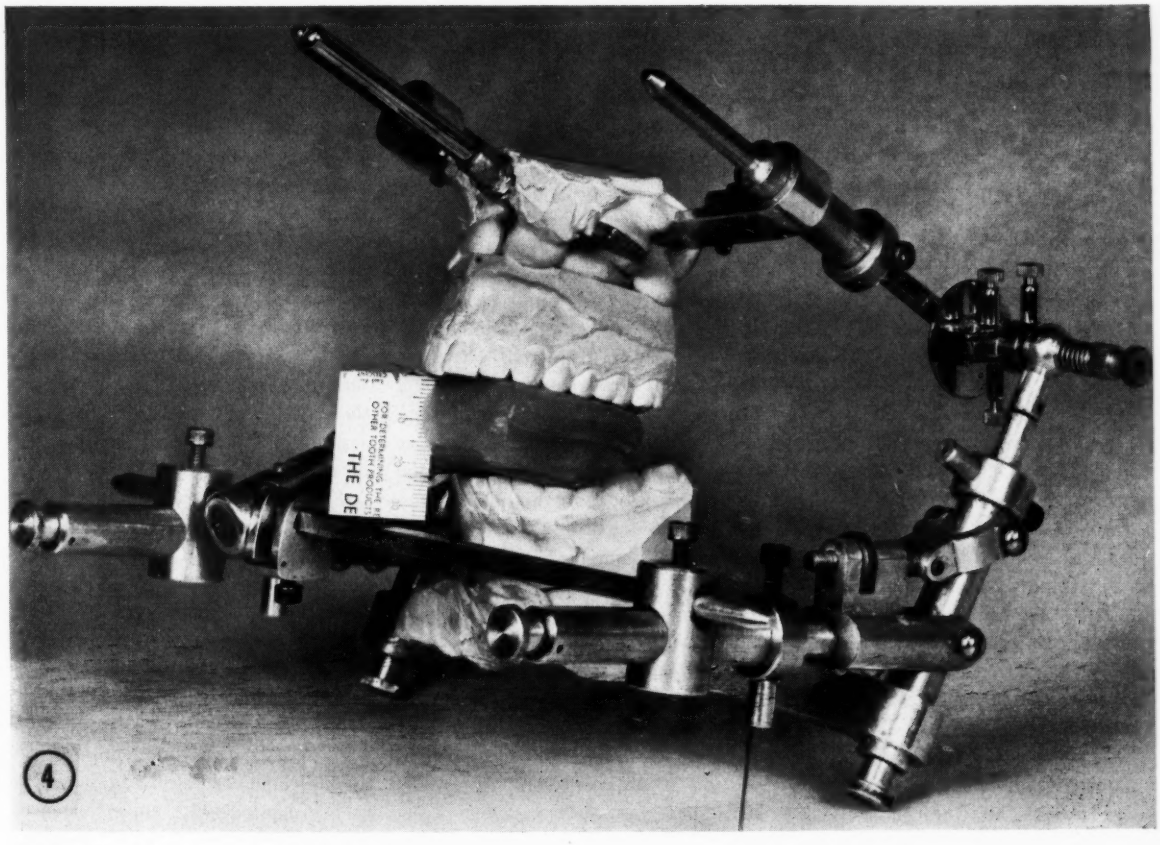
line and also the line along which the cusps are just free of contact. As in Figure 1, the distance from CR&CC to CO or centric occlusion is 2 millimeters. Using the same angles, radii and measurements as those in Figure 1, the true and erroneous travel paths or closure arcs from centric relation to centric occlusion have again been scribed. As before, diverging arcs show that cuspal interference with its well known and sad consequences will follow the use of centric relation.

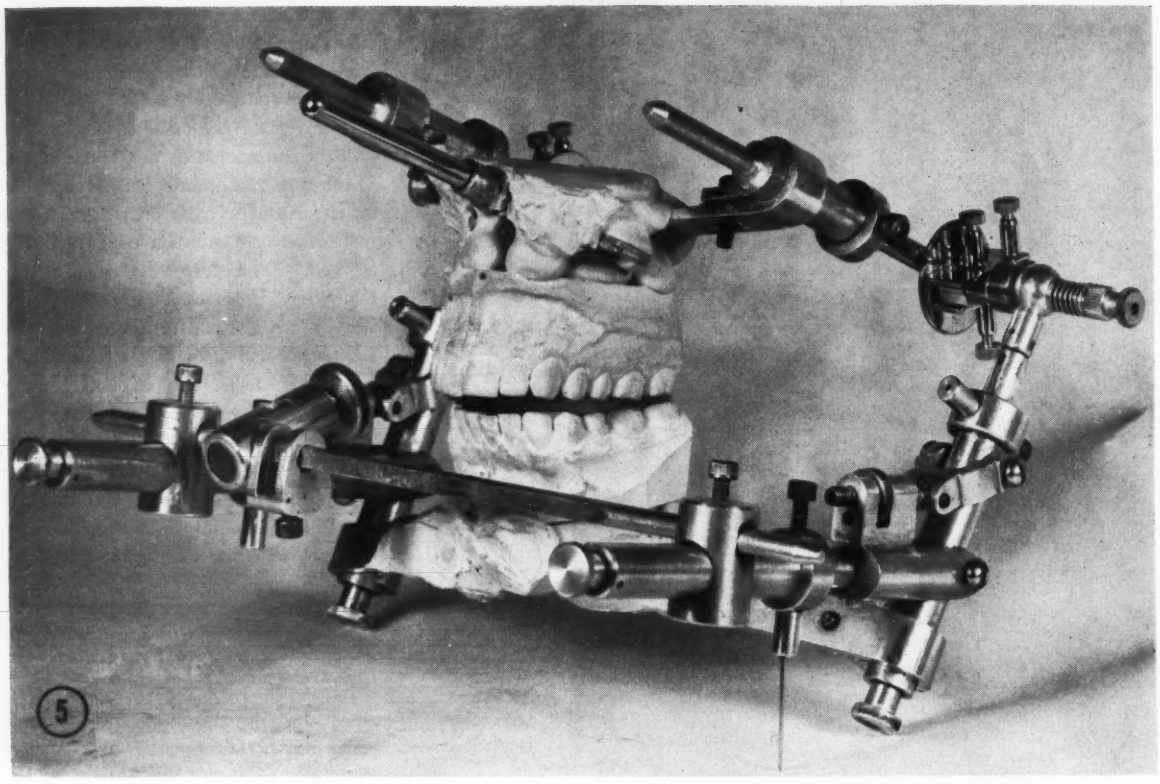
Difference Between Figures 1 *and* 2—There is one highly significant difference between the stories told by Figure 1 and Figure 2:

Figure 1 shows that the points of greatest divergence among the closure arcs lie on line CC indicating that

3. ***Hinge check bite. Twenty-two millimeters occlusal separation.***

4. ***Twenty-two millimeters occlusal separation bite accepted by Transograph.***





5. ***Four-millimeters occlusal separation bite accepted by Transograph.***

interferences in the edentulous case are heaviest at the cusp tips where they are most likely to unseat the dentures and create trauma. The divergences decrease until they are nil at centric relation and occlusion. If the patient could reach centric relation and occlusion without clashing, centric occlusion would be accurate.

Figure 2 shows that the interferences in the dentulous case are just the opposite; they are nil at the cusp tips (centric relation) and increase to greatest intensity at final or centric occlusion. *If* the patient could force his teeth through the steadily increasing traumatogenic interferences, final *or centric occlusion would be destructively inaccurate.*

Import of Illustrations—It should not be necessary to elaborate on the serious import of either Figure 1 or 2. Both substantiate the common observation that centric relation mountings in an articulator (any articulator) do not duplicate functional jaw relationships. Centric relation bites with minimal occlusal separation are neither comparable to hinge bites nor are they safe.

Method Used in Transograph

In contrast to the fallibility of the centric relation bite, it should now be apparent why *a hinge bite does not invite trouble* when the jaw position or vertical dimension is changed. And, since the arc of closure or travel path in the articulator is the same as in the head, a deep matrix in a thick wax wafer also creates no problem. Lower teeth, mounted in the articulator will pass freely along the wax paths cut by the teeth during the mouth bite. In fact, this is the standard method of testing the hinge-axes and cranial plane mountings in Transographic procedures. When using hinge-axes and cranial planes that have been proved correct, there is no need to fear the mechanical difference in the mouth and instrument closure paths or the incorrect occlusion that are so disastrously common to centric relation mountings. Suppose we illustrate.

Occlusal Separation Accepted—In Figure 3, a hinge bite with not two but *twenty-two* millimeters of separation was taken in the patient's mouth. In Figure 4, the same bite is shown being accepted perfectly by the Transograph which was, incidentally, mounted originally to an occlusal separation bite of about ten millimeters. In Figure 5, an occlusal separation bite of approximately four millimeters is also being accepted perfectly by the Transograph. Careful check with silk articulating ribbon then revealed the occlusal contacts in the patient's mouth and in the Transograph to be identical. This was to be expected.

Verification of Transographic Principles — Subsequently, the patient, Doctor Raymond Gustafson of Minneapolis, decided to correct his own articulation. Already versed in Transographics, he used new hydrocolloid impressions and new stone casts with hinge-axes and cranial plane registrations and mountings in a second Transograph. The occlusal contacts and the indicated corrections again proved to be identical with those produced

by the first registrations and mountings in the first instrument. This was and is consistent with results being secured universally by Transographic operators. Here we have another of the now countless practical and mechanical verifications of the hinge-axes and cranial plane principles in Transographic articulation.

Minute Errors Detected—To the objection that it is impossible to know that the teeth have entered the wax matrixes exactly, attention is called to the two tall screws on top of the condyle slides. These are pointed at the ends and are machined to fit perfectly into V-shaped seats in the condyle plates. When these screws are loosened, the Transograph becomes a universal joint. If either the mounting or the bite be incorrect, the condyle plates will move in their slides as the teeth accommodate themselves to the wax matrixes. Errors as minute as one-fiftieth of a millimeter in any direction are instantly apparent. This is far more accurate than the Needles split cast method and is automatic and instantaneous.

Summary

It has been contended that dental lexicographers should confine their attention to publishing titles and definitions according to the acknowledged authorities in the subject being defined. A true case has been cited showing the unfortunate mistakes when subjective meaning is interjected.

The relative importance of "hinge opening position" and hinge closing position has been disclosed to the detriment of the former. Centric relation has been revealed as either the inaccurate beginning or the unattainable terminal of function and therefore dangerous to the kinematics of articulation.

104 *Garfield Avenue.*

Temporomandibular Arthritis, Mandibular Displacement and Facial Pain

J. P. WALSH, M.B., B.S., B.D.Sc. (Melb.), L.D.S. (Vic.), F.D.S., R.C.S. (Eng.)

Part One—A Discussion of Fifty-Five Cases

The following questionnaire was sent to 55 patients treated, and replies have been received from fifty-one:

1. Are you at present
   - (a) relieved of symptoms
   - (b) much better
   - (c) improved
   - (d) no better
   - (e) worse
2. Any comments
3. Date
4. Signature

In order to analyse the various aspects of the condition, all patients were listed in alphabetic order and the following facts noted: sex, age, main complaints, source of reference, treatment, time elapsed since treatment completed, result and general comments.

Analysis of Findings—Sex: 44 patients were female and 11 male; a ratio of 4 to 1.

There is no obvious explanation of this finding; but since the incidence of malocclusion shows no such sex distribution, there must be some other anatomic or physiologic reason, and further investigation is indicated.

The relatively early onset of the condition is most striking, but of the 18 cases under 40, only 6 had teeth in both jaws. Occlusal deformity of course often begins in childhood.

Age Distribution
Table 1

Age	No.
20-29	8
30-39	10
40-49	15
50-59	7
60-69	11
Over 70	3
Not recorded	1

Main Complaints—(1) All patients except one presented with pain as the main symptom, although some described this pain as a headache.

(2) The pain syndrome in the group as a whole was complex. Although largely confined to the distribution of the fifth nerve, it sometimes spread over the back of the neck and to the throat.

(3) The pain was bilateral in nine cases, left-sided in 13 cases, and right-sided in 32 cases.

(4) In the remaining case the main symptom was described as a "dragging feeling in the head." This patient did not respond to dental treatment. His condition improved with bodily rest, and there was always some doubt concerning the diagnosis.

(5) Auditory symptoms such as clicking, tinnitus, and stuffiness in the ears, and earache were common. Some patients complained of deafness, but improvement in hearing following treatment was not carefully investigated.

(6) Tenderness over one or both temporomandibular joints was a common finding.

(7) All patients showed a "closed bite" and most showed retroposition of the condyles on palpation in the external auditory canals.

(8) Clicking and abnormal movements of one or both condyles were also common findings.

Source of Reference
Table 2

Source	
Otolaryngology Department, Dunedin Hospital	21
Neurosurgery Department, Dunedin Hospital	8
Psychiatry Department, Dunedin Hospital	8
Private Physicians	7
Hospital Medical Officer	2
Private dentist	2
Other patients	2
Dental student	1
Own staff	2
Not recorded	2

Deduction—The deduction that can reasonably be drawn is that patients with facial pain which is not of obvi-

(*Continued on page* 41)

Approach to MOUTH RECONSTRUCTION

Part One

MURRAY N. RUBINSTEIN, D.D.S., New York

DIGEST

The problems in reconstruction that confront the dentist are many and varied. While it is impossible to state a simple formula for success in treatment, observation and practice that embody well-established principles will prevent costly mistakes. A review of the accepted concepts inherent in the attainment of successful results in reconstruction is presented in this series of five articles.

Basic Requirements

The subject of occlusal reconstruction which continues to be of major professional interest has resulted in improved treatment planning, clinical procedures, and techniques. The natural consequence is more efficient service for patients, increased comfort, and most important, longer life for the natural dentition. The last is of major importance because as the life span is constantly lengthened, the retention of teeth is of obvious advantage. It is indisputable that through the restoration of occlusal harmony dental longevity may be increased.

Diagnosis—Treatment planning according to established principles in reconstruction, proper diagnosis, and careful execution of the indicated procedures will provide satisfaction to the dentist and dramatic results to the patient. It is the opinion of the author that success in these procedures may be achieved by any capable and conscientious practicing dentist. Study of the approach to the problem and observance of a systematized routine in treatment will enable the dentist gradually to attain clinical efficiency in case management.

Fundamental Objectives—Certain basic rules in reconstruction should be observed in practice to assure a result worth the effort and expense. Errors, difficult to correct without resorting to a costly remake or loss of the all-important abutment teeth, may be avoided. The fundamental objective should be that stated by Seides,[1] "our aim in reconstruction should be to rebuild a disordered dental mechanism into an orderly one."

Primary Factors—In a previously published article the author[2] listed the primary factors in mouth rehabilitation: "The considerations in mouth rehabilitation have as their principal concern the reestablishment of occlusal harmony integrated with principles consistent with function. The ultimate aim as far as possible, should be to rebuild the dentition to an equilibrated occlusion, where maximum tooth contact in any of the mandibular positions may be obtained in function. With the masticatory load thus reduced on individual teeth, it is not too presumptuous to expect improved physiologic tone and general dental health."

[1]Seides, Harry M.: Factors of Occlusion in Relation to Mouth Rehabilitation, JADA **30**:241-248 (Feb.) 1943.

[2]Rubinstein, M. N.: Occlusal Rehabilitation in Practice, DENTAL DIGEST **58**:465 (April) 1952.

Classification of Cases

A convenient general listing of cases requiring occlusal rehabilitation which are most frequently encountered is presented:[3]

1. Where all or most of the teeth are present, yet are seriously abraded occlusally, with or without attendant trauma (Figs. 1A, 1B, and 1C).

2. Loss of a number of teeth with various lengths of edentulous spans and no replacements having been made for a long time, resulting in exfoliation of teeth opposite the edentulous area (Figs. 2A, 2B, and 2C).

3. Extreme overbites with fanning anteriors resulting frequently in gingival inflammation (Figs 3A, and 3B).

4. Cases requiring upper and lower partial restorations with complete loss of articulatory relationship due to tooth migration (Figs. 4A, and 4B).

5. Prognathism of greater or lesser extent induced by loss of teeth and abrasion of the anterior teeth incisally, resulting in a lingual articulation of the upper anteriors (Figs. 5A, and 5B).

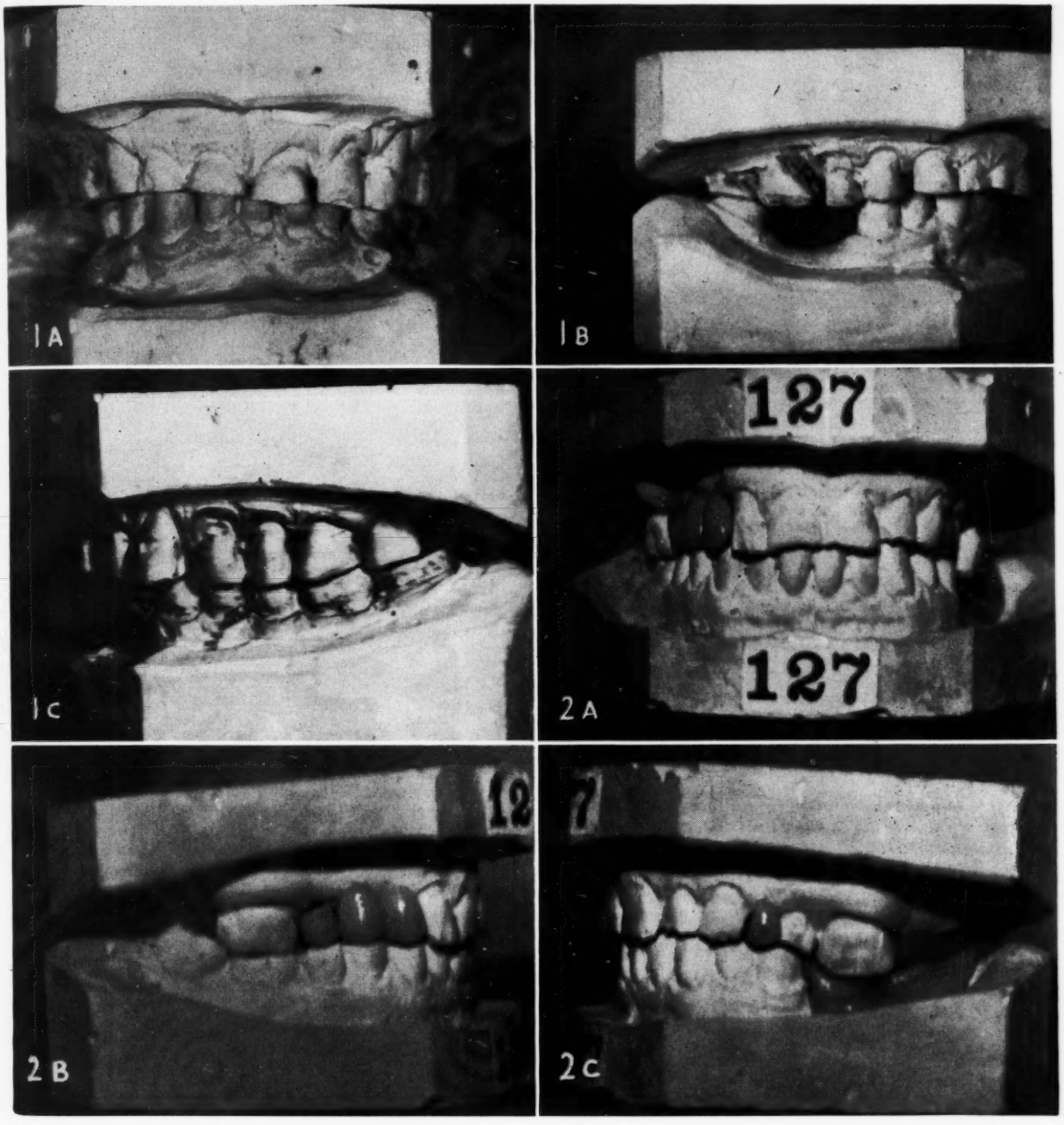
6. Cases where appearance causes social disadvantage (Fig. 6).

7. Cases of extreme tooth destruction due to high caries index (Fig. 7).

There are many variations but the categorical description presented is in general a comprehensive listing of the problems encountered.

Prevention Recommended—Unfortunately, errors of commission and of omission in past treatment or lack of

[3]Schwartz, J. R.: Occlusion—What It Means to the Prosthodontist, N. Y. J. Dent. **16**:4 (April) 1946.



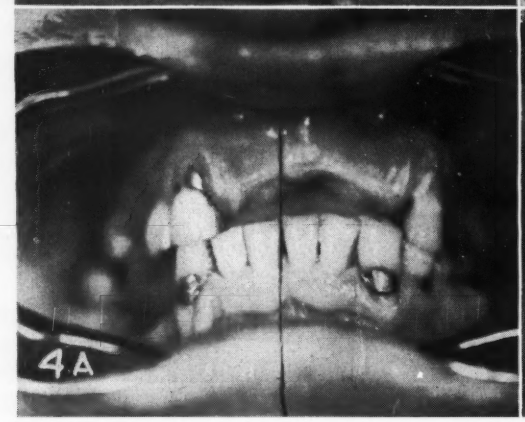
1A. *Anterior projection.*
1B. *Right side.*
1C. *Left side.*

2A. *Anterior projection.*
2B. *Right side.*
2C. *Left side. Note extreme extrusion of the molar.*

treatment are responsible for many cases requiring extensive correction. It seems to the author that the dentist's first effort should be to prevent the development of flagrant malocclusion. A plea is made for long range treatment planning and execution from the beginning, starting when the patient first presents for the treatment of caries, involving even a single tooth. There should be proper rebuilding of the lost tooth areas with correctly harmonized cuspal inclines and contact form. Should the patient require tooth replacement, extrusions and occlusal disharmonies should be reduced and corrected before any restoration is started.

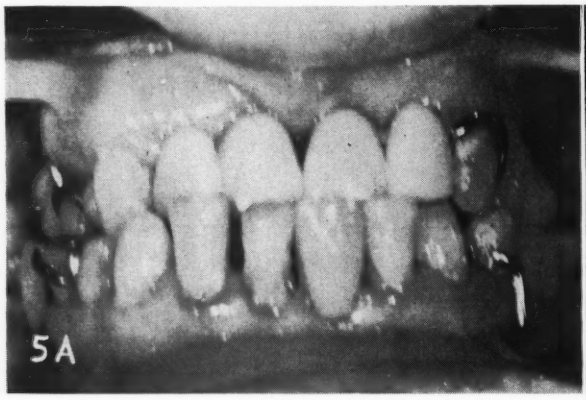
This approach will avoid the creation and perpetuation of a faulty occlusion and prevent the possibility of future failures.

Neglect a Wasteful Process—It is obvious that if the patient has not received proper dental care previously, he will eventually accumulate an assortment of problems which require a revision of all the procedures completed and may actually require complete rehabilitation.



3A. *Note gingival inflammation on upper laterals and also the marked shift of the median line.*
3B. *Extreme overbite with marked drift of upper anteriors.*

4A. *Shift of mandible to right, full width of central. The patient presented with marked TMJ involvement.*
4B. *Complete loss of occlusal relationship from migration due to uneven wear.*



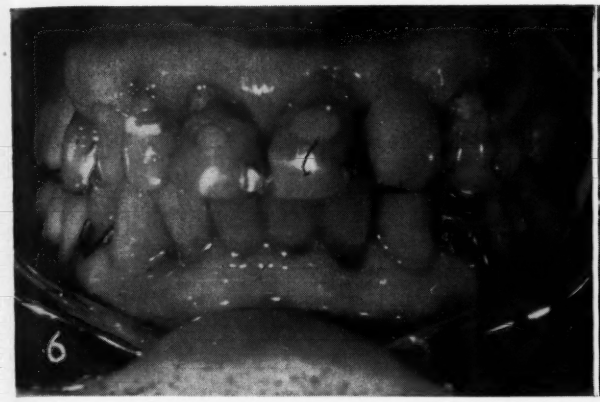
5A. *Anterior drift of mandible caused by occlusal wear of posteriors.*

5B. *Prognathism accentuated by erroneous set-up of upper denture.*

Basic Rules for Determining Correction

In treatment planning observations drawn from the clinical demonstration of many practitioners are basic rules in determining correction:

1. Of first importance, in general an increase of vertical dimension should be avoided. The rule should be that unless there are symptoms of temporomandibular disorders, it is desirable to restore the damaged teeth to a level consistent with the age of the patient.



6. *The appearance of this patient was a source of embarrassment*

7. *Constant recurrence of caries affected the entire mouth.*

2. The buccolingual diameter of all rebuilt teeth should be kept to a minimum. This will tend to reduce the stress of mastication by confining the load in a line with the long axes of the teeth where it can best be borne.

3. Lateral balance should be secured in eccentric positions of the mandible for the maximum distribution of stress.

Functional Occlusion in Natural Teeth—According to Bastian,[4] "As far as possible, functional occlusion should be established. Mandibular teeth should remain in maximum contact with their antagonists on the working side during normal chewing movements without interference from any tooth or teeth. Functional occlusion differs from balanced functional occlusion in that with the latter, opposing teeth are not only in maximum contact on the working side but at the same time are in modified contact on the balancing side. In full upper and lower dentures, this is a prime requisite to achieve stability to the dentures. While it would be ideal to secure similar balance with the natural teeth, it has been authoritatively established that such bilateral balance is not necessary."[5]

Total Function a Necessity—Clinical experience supports Bastian's statement. It is nevertheless a basic necessity that each part of the dentition must function in some movement of the mandible for maximum comfort and retention of the dental apparatus. Lack of function is as injurious as overfunction.

Obtaining Maximum Distribution of Stress

To obtain maximum distribution of stress the following factors should be borne in mind:[6]

(a) Retention of the rest position with the establishment of average freeway space of 3 millimeters.

(b) Maximum distribution of stress in centric relation.

(c) Harmony of inclined planes which will reduce eccentric occlusal stresses. The planes of the teeth should be restored at a level and degree consonant with the age of the patient.

(d) Reduction of inclines of guiding tooth surfaces so that occlusal stresses may be more favorably applied to the supporting tissues, in the direction of the long axes of the teeth.

(e) Retention of tooth anatomy to secure sharper cutting cusps and good sluiceways.

(f) The requirement of biomechanics that the clinical crown should be definitely shorter than the length of root surrounded by bone must be observed and the buccolingual diameter of all rebuilt teeth should be kept to a minimum.

(g) It is essential to secure lateral balance on the working side in eccentric positions of the mandible for the maximum distribution of stress. If possible, try to achieve bilateral balance.

(h) Secure an occlusion that will permit free gliding or sliding movements.

(i) Establish centric occlusion at centric relation.

The summary of factors outlined is a cardinal guide in any plan for restoration. Correct diagnosis and treatment planning based on the principles listed above should assure attainment of a successful result.

Oral Diagnosis

Thorough diagnostic procedure is of vital importance in establishing cause and effect. Comprehension of the problem involved can only be determined from complete diagnosis of the conditions that exist. It is in this way that a plan of treatment can be evolved that will be of benefit to the patient. As stated by Godfrey,[7] "Many mechanical failures and disturbances of physiologic processes probably would not occur if all the factors were given proper consideration before restorative work was commenced."

Occlusal Correction a Common Need—It is noted that in a thorough examination a surprising number of patients are found to be in need of some correction of the occlusal factor in varying degree. If the value of such correction in preventing future

[4]Bastian, C. C.: Occlusal Reconstruction, N. Y. J. Dent. **17**:265 (Oct.) 1947.

[5]Grewcock, R. J. G.: Discussion of Occlusion, Internat. D. J. **3**:488 (June) 1953.

[6]Schuyler, C. H.: Fundamental Principles in the Correction of Occlusal Disharmony, JADA **22**:1193 (July) 1935.

[7]Godfrey, R. J.: Discussion of A. A. Steiger's Report, Internat. D. J. **3**:4 (June) 1953.

breakdown or complications is adequately explained, the patient will more readily accept the proposed plan of treatment than refuse it.

Destructive Forces Averted—When some teeth are lost the problem of arresting the natural destructive forces which almost immediately become operative must be solved while avoiding the introduction of mechanical destructive forces incidental to the insertion of a replacement for the lost teeth.

Basic Points in Patient Management—There are three basic points in patient management that have been previously cited to good advantage by McCollum, "Service to our patients is threefold: to find out what the condition is, to decide what can be done about it, and to carry out the treatment planned."

Oral Diagnostic Procedure

The following considerations are a necessary part of oral diagnostic procerure:[8]

1. Patient history and information concerning his general health

2. Observation of the patient's oral health and hygiene

3. Condition and location of remaining teeth

4. Vitality tests

5. Accurate full mouth x-ray series including bitewings. Bitewing views are essential as they record accurate details of the pulp anatomy which are prerequisite in crown preparations and are not as well shown in periapical views

6. Accurate alginate impressions of the mouth from which a duplicate set of study models are obtained. The first set is used for reference purposes and the second set will be mounted on an articulator for study purposes. Study models are a prerequisite in the examination technique. The mounted models will disclose defects much more easily than the mouth. Factors to observe on the models in conjunction with x-rays are the following:[9]

(a) Plunger cusps

(b) Food impaction areas

(c) Facets caused by wear

(d) Limitations of reshaping of teeth

(e) Notations of tooth position, inclination, tooth size, spaces, and locations

(f) Differential between centric occlusion and centric relation

(g) Elongated or extruded teeth

(h) Limiting of motion of mandible due to shifted teeth or cuspal interference

(i) Loss of vertical dimension

(j) Planning for construction of splints for mobile teeth

(k) In edentulous areas, undercuts may be easily discerned

(l) Mounted study casts may also be used after diagnosis for the construction of temporary appliances where indicated

7. The next step is to take an unstrained centric relation wax record. A simple method of proved accuracy to secure this registration is the wax check bite as described originally by Schuyler.[10]

200 *Central Park South.*

[8]Rubinstein, M. N.: Mouth Rehabilitation in Practice, DENTAL DIGEST **59**:207 (May) 1953.
[9]Schoenefeld, S. J.: Study Models, N.Y. J. Dent. **19**:333 (Oct.) 1949.

[10]Schuyler, Clyde H.: Intraoral Method of Establishing Maxillo-Mandibular Relation, JADA **19**:1103 (June) 1932.

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Signs of Anxiety

IAN STEVENSON, M.D.

THE PHYSICIAN should search for evidences of anxiety or emotional disturbance outside the cardiovascular system. Thus he may find such symptoms as insommia, impotence, anorexia and difficulty in concentrating. These are four cardinal symptoms of anxiety. They are not symptoms of structural heart disease in the absence of cardiac failure. Or the physical examination may show such signs of anxiety as dilated pupils, tremor of the outstretched hands, palmar and axillary sweating and dry mouth. A somewhat expressionless face which lacks the usual mobility of the relaxed facial expression is also suggestive of anxiety and more typical than the commonly expected "scared rabbit" appearance. Muscular restlessness of limbs or frequent change in body posture may also betray underlying emotional disturbance. All these signs, according to their number and the degree to which they are present, point to the presence of anxiety even when the patient denies this and does not appear on superficial inspection to be anxious. The discovery of these signs and symptoms greatly increases the likelihood that a portion of the disabling symptoms is related to emotional disturbance.

From *Medical Clinics of North America* **38**:1541 (September) 1954.

The EDITOR'S *Page*

THE ENGLISH language does not suffer from a paucity of words to describe the procedures of the dentist who constructs appliances to replace missing body parts. This activity has been called maxillo-facial prosthesis and *stomato*-prosthesis. Both these words are lacking in exactness because they confine the activity to the replacement of lost oral and contiguous tissues. Actually, the dentist who is interested in this kind of work is often called upon to restore other body parts and tissues: ears, eyes, noses, genitalia, skull parts. A more exact word for these broadened activities might be *somato*-prosthesis, although we hesitate to add another word to the dental dictionary.

On infrequent occasions before World War I the dentist was called on to repair the jaw fractures that were incurred in barroom brawls, from run-away horses, and from accidents in the field and shop. Occasionally the dentist was asked to replace the widespread loss of tissue from a malignant disease or from surgery. It has been reported that President Grant received this kind of maxillo-facial prosthesis from a dentist.

World War I brought high velocity missiles, tanks used on land, airplanes in the sky. With this increased mechanization in the tools of war there were more maxillo-facial injuries and more calls on the prosthetic skills of the dentist.

In the intervals between World War I and World War II, there began an increasing awareness in some of the larger medical centers of the role the dentist could play in the rehabilitation of cleft palate cripples, and in repairing gross tissue-loss by prosthesis. In addition to this awakening among the medical centers, materials were developed for dental use that were readily diverted to use in other tissues. Notable examples are the chromium-cobalt-molybdenum alloys and the methyl methacrylates. The alloy has been widely adapted in orthopedics and the plastic for repair of cranial defects and facial tissue loss.

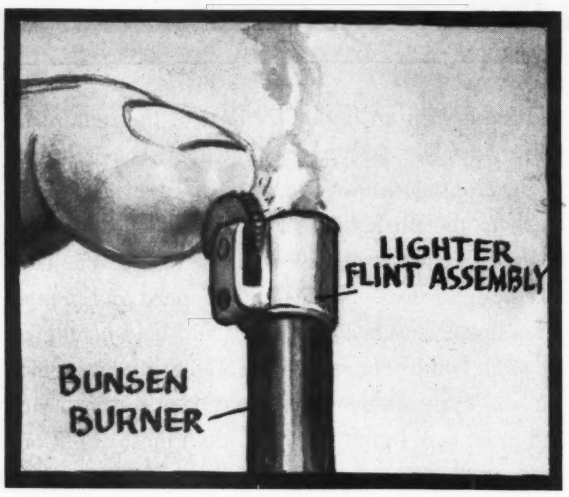
World War II brought the dentist into his own and made him an important part of the rehabilitation team. The early work that dentists performed in developing ocular prosthesis is a bright credit mark to the profession. The instruments of tissue destruction that were developed in World War II—missiles and projectiles of higher speed and greater force, faster and heavier planes and land machines, the atom bomb—brought more facial injuries. Since the war more automobiles have been on the roads and more men in the factories. Both these situations increase the incidences of facial injuries.

By training and experience the dentist alone among the health professions (except the orthopedist) is prepared to manipulate materials and to fabricate them into suitable forms to replace body parts that have been destroyed by injury or disease. There is nothing in medical training that prepares the physician to handle metals and plastics to replace body parts. Technical training in medical colleges is nonexistent even for those who expect to concentrate on the mechanical phases of medical practice—surgery and orthopedics. What a dentist may be lacking in some of the biologic sciences is compensated by his superb training in mechanics and bioengineering.

No one can deny that the dentist is highly trained in the skills to manipulate material things in order to replace the ravages of disease or injury. It is a simple transition for him to use these same skills to replace destroyed or missing tissues in *all* parts of the body. These talents of his will be used in a constantly increasing degree.

In this important work of somato-prosthesis the dentist will call upon the expert craftsmanship of the dental technician. A book has been written that describes the laboratory techniques that are followed in the fabrication of appliances to replace facial and other body parts.[1] Without such a basic book on methods each technician was required to improvise. Now he has a well-illustrated manual to guide him.

[1]Brasier, Stanley: Maxillo-facial Laboratory Technique and Facial Prostheses, London, Henry Kimpton, 1954.



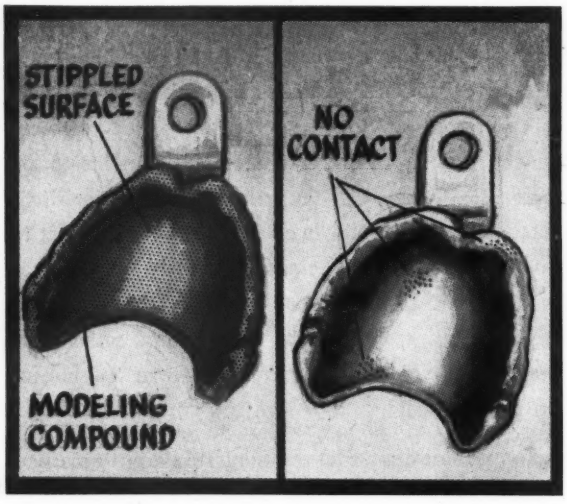
1

Clinical and Laborato

Bunsen Burner Lighter

Stanley N. Schwartz, D.D.S., Forest Hills, New York

1. Remove the wick assembly from an inexpensive cigaret lighter and attach the flint portion to the head of the Bunsen burner.

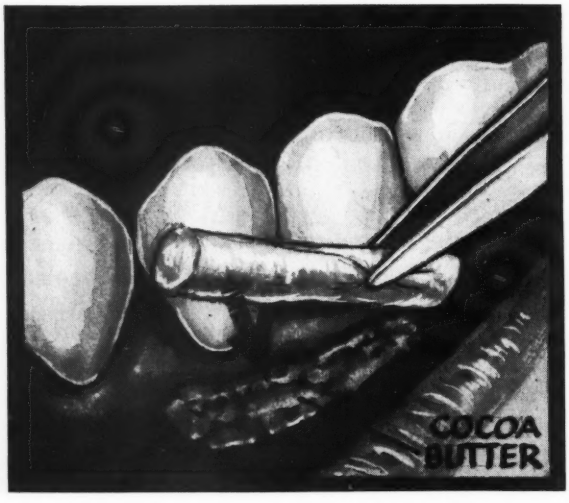


2

Testing an Impression for Tissue Contact

Ben E. Pleshette, D.D.S., New York

2. Immediately before inserting the impression in the mouth, lightly stipple the entire surface with a wire bur brush. After insertion in the mouth, the stipple marks will remain in those areas where the impression material does not make tissue contact. This facilitates the recognition and correction of those areas.



3

Preventing Cotton Roll Irritation

John H. Van Ness, D.D.S., Ithaca, New York

3. Cover the tissue sides of a cotton roll with cocoa butter, leaving the top sides and ends to absorb saliva. This has proved to be effective on persons with hypersensitivity of their soft tissue.

READERS *are Urged to Collect* $10.00

For every practical clinical or laboratory suggestion that is usable, DENTAL DIGEST will pay $10.00 on publication.

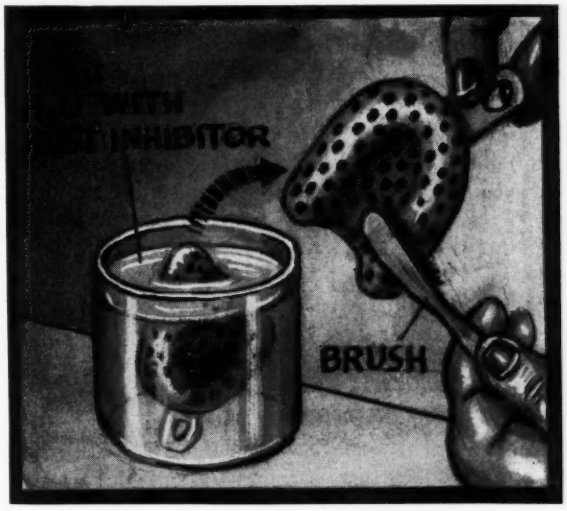
You do not have to write an article. Furnish us with rough drawings or sketches, from which we will make suitable illustrations; write a brief description of the

SUGGESTIONS . . .

Cleaning Impression Trays

Edwin T. Triba, D.D.S., Omaha, Nebraska

4. Remove the bulk of the used impression material. To a quart of water add 1 tablespoonful of Oronox Rust Inhibitor. Stir the solution and put the trays in the pan. After an hour in the solution a few strokes with a denture brush will remove all remaining impression material and the trays will have a burnished look.



4

Postoperative Surgery Packets

Richard L. Sharp, D.D.S., Alhambra, California

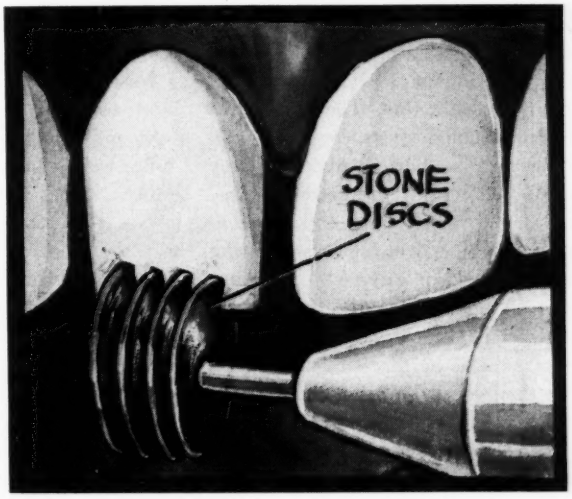
5. Place the following items in a 4 by 5-inch cellophane bag: 1. Eight or 10 gauze sponges. 2. Instructions for care of the mouth after extractions. 3. One or two individual packages of analgesic. Staple the package in two or three places along the top. The packet provides a hygienic method of storing these supplies and is a time-saver when the patient is dismissed.

5

Porcelain Jacket Preparation

J. W. Siegfried, D.D.S., Santa Monica, California

6. Use several discs mounted together to make the starting cuts on the incisal for a porcelain jacket preparation.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 42 for a convenient form to use.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

Surgical Treatment of Congenital Deformities of the Face

Surgical treatment of congenital deformities of the face can do much to improve the lives of infants, young people and adults. These deformities are always distressing to all concerned.

Harelip should be repaired as soon after birth as feasible—usually on the fifth to seventh day. Such treatment eliminates much of the probability of unsightly scarring. Still, there are adults with conspicuous scars. Often these persons are self-conscious and lead secluded lives where possible rather than suffer the embarrassment of constant stares. Modern plastic procedures can be carried out on these lips and the deformities greatly improved.

It appears that cleft palates are best left alone until the child is just ready to talk. Two years seems about the ideal age to attempt these closures. The operation can be done at any age.

Moles of all sizes present problems in correction. Small moles usually can be excised in one or more stages. Some larger moles require large skin grafts which subsequently can be reduced in size by multiple excisions. Other large and irregular moles require a combination of skin excisions, pedicle transfers, and eyebrow grafts, before acceptable results are obtained.

Ear deformities are quite common in children and quite conspicuous especially in boys. Congenitally small or missing ears usually require a series of about six operations, covering a period of 9 to 12 months for their reconstruction. The body of the ear is usually constructed over cartilage grafts buried under nearby skin. "Lop ears" are extremely distressing to small boys and the constant ridicule from playmates who call them "mule ears," "elephant ears," "jug handle ears," makes them antisocial. Girls usually can hide the ears with the hairdress but now, with the "upsweep" hairdress in fashion, they frequently seek correction. It seems better to correct all deformities in children wherever possible before school age and thereby spare them these painful incidents.

MEDICINE and the Biologic Sciences

One of the most distressing conditions that results in lifelong disfigurement is the acne of adolescence. Serious acne infections are difficult to combat and while present are extremely embarrassing to the victims. The resultant pits from acne infections, and smallpox, and also powder burns, can now be greatly improved by one or more sanding treatments or occasionally by skin debriding with a dermatone. One treatment will often suffice but several may be needed in deeply pitted faces. Results are most gratifying to this group of self-conscious patients.

Nasal deformity probably is the most common condition the plastic surgeon is called on to treat. It is quite well agreed that the proper esthetic angles for a nose are as follows: The profile angle (or angle that the nose stands out from the face) should be about 30 degrees. The tip angle in a man should be about 90 degrees or a little more, but in a woman it should be 20 to 25 degrees above a right angle, depending on the chin line, age, and similar factors. As we grow older, the tip of the nose drops, therefore simply shortening the tip of the nose will take years off the facial appearance.

Advancing years may add deformities to the face. The gradual dropping of the nasal tip, the relaxation of the eyelid skin into superflous folds in both upper and lower lids and, in fact, the relaxing of the whole facial and neck skin may cause a premature aging appearance that works an economic handicap to such victims.

If, by carefully planned surgical procedures, these telltale aging signs can be eliminated, many years of profitable employment can be added to the life span of these persons. Such an operation not only is an economic uplift, but also is a great morale builder. These patients have a new zest for life and their jobs.

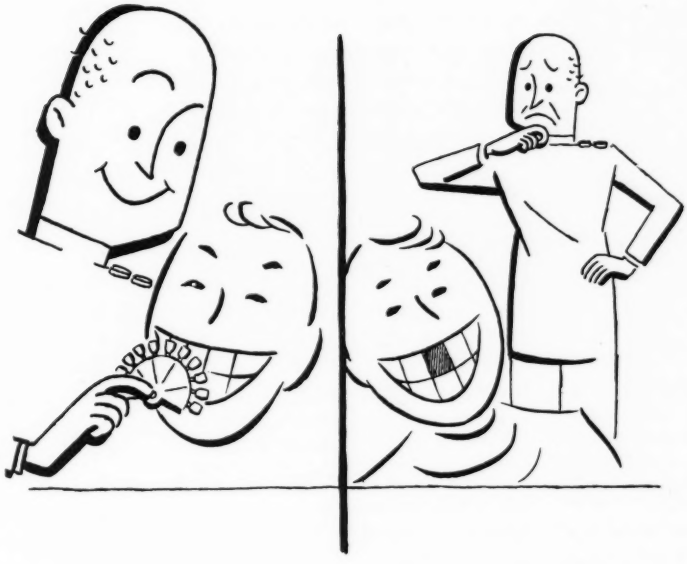
Straith, Claire L., and Straith, Richard E.: Treatment of Facial Injuries and Deformities, Postgrad. **14**:165-172 (*September*) 1953.

Problems of Breast Cancer

At the present time a great deal of attention and energy are expanded in the radical treatment of breast lesions that are predestined at the time to be lethal. Any further progress with mammary carcinoma must be in determining how to recognize and eradicate the precancerous breast.

Pathologic, clinical, and statistical observations show that the biologic behavior of cancers of the breast has little correlation with (1) the so-called early lesion, (2) the clinical symptoms, and (3) the location, size, or duration of the tumor. In one-half of the cases, auxillary lymph nodes are involved when growth is known to have been present less than one month.

The several modes of tumor spread are disregarded today because of over-emphasis on lymphatic spread. This is based on the frequent misconception that the lymphatic system is an autonomous circulatory system until reaching the major blood vessels. However, blood and lymphatic systems at the point of tissue-fluid movements are closely related. Here-



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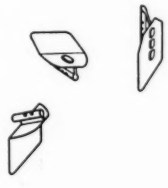

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in lies the explanation of the all too frequent case with a small early lesion and uninvolved nodes, yet with widespread blood-born metastases.

Many surgeons advocate surgical exploration. Employing proper procedures, the exploration is done with rapidity and is never injurious to the patient. The results of such a study reveal that too much attention is being given to the axillary avenue of spread and far too little to spread along the internal mammary vessels. Intercostal metastases without axillary involvement are rare.

The site of the lesion does not necessarily determine the direction of spread. Many lesions in the outer quadrants of the breast spread to the internal mammary lymph nodes. Any operative procedure considered necessary in this area therefore should not be limited to medial quadrant lesions alone.

Radical mastectomy, as now performed, is grossly inadequate in dealing with cancer of the breast since the lesion has spread to the internal mammary lymph chain in a large percentage of cases. All patients with internal mammary spread at the time of radical mastectomy are dead in three years.

The problem has two solutions: (1) If surgery is the answer, the surgery should be all-inclusive. The surgical scope should include axilla, supraclavicular and retroclavicular structures, en bloc dissection of the internal mammary chain and anterior mediastinal structures. Many are skeptical that any operative procedure can accomplish this.

(2) If cancer can be proved by biopsy or frozen section of the lymph nodes at the time of the initial surgery to have extended to the supraclavicular or internal mammary nodes, then the cancer is surgically incurable and a simple mastectomy should be performed. After wound healing, deep roentgen therapy is administered to the axilla and the supraclavicular and internal mammary chains bilaterally, in the hope, not of curing, but of delaying the progress of the tumor.

Hutchinson, William B.: Intercostal Dissection and Radical Mastectomy, Arch. Surg. **66**:440-455 *(September)* 1953.

Low Back Pain

Common backache causes much human discomfort and loss of industrial manpower. Much of this can be prevented by proper attention to diagnosis and treatment.

In general, low back pain does not mean backache from (1) sudden muscle strains, (2) tuberculosis, (3) metastatic tumors, or (4) rheumatoid arthritis. The condition is quite common and is too often dismissed as malingering or neurosis. Often it is treated to no purpose by diathermy. A complete history and physical examination as well as a thorough orthopedic study of the patient should be made. Roentgenograms of the lumbosacral area are essential.

Frequently the sacroiliac joint is blamed for low back pain. However, the lumbosacral joint is much more apt to cause trouble. The lumbosacral angle, which should be 14 to 40 degrees may attain 60 to 80 degrees owing to man's erect stance. The ligaments are thereby greatly stretched. The angle is affected by the slant of the sacrum and by the ability of abdominal and gluteal muscles to protect the joint from sudden movement. (1) Hard work, (2) sedentary living, (3) obesity with weak abdominal musculature, and (4) anomalies causing unstable vertebrae can all lead to pain in this joint.

An unstable vertebra may cause added stress on the disc and produce degeneration of the disc material with subsequent herniation. If the degenerated disc is still encapsulated, bed rest or manipulation may relieve the pain.

If the disc material has herniated through the capsule and a fragment is lying against a nerve root, disc removal is necessary. A stabilization procedure must follow disc removal if the patient has low back instability.

About 80 to 90 per cent of persons with common backache do not need operations. Diathermy will not help. The trouble is postural and can be vastly improved or even cured with good medical management and exercises. Reduction of excess weight may be required.

Probably the most important factor in treatment is strengthening of abdominal and gluteal muscles. Exercises must be carefully instituted and supervised because too many patients are lazy, easily discouraged, or both.

Thompson, W. A. L.: Keeping the Patient with Low Back Pain Employable, Indust. Med. and Surg. **22**:318-321 *(July)* 1953.

Postural Deformities of Children

During routine physical examinations many children between the ages of five to 10 are found to have postural deformities. Such deformities are not a natural accompaniment of growth. Spontaneous correction of postural deformity is rare. Therapeutic measures employed during early disalinement need not disturb the child's ordinary activities. Prophylactic measures can be started soon after birth.

A child has normal posture (1) if the head is balanced over the torso with no forward or backward displacement, the chest projects farther forward than any other section of the body, (2) if no appreciable anteroposterior curves are noted in the spine, and (4) if the abdomen is not protuberant. If the chest is not flat, the shoulders cannot be rounded, since the same muscles control both. If the abdominal muscles are relaxed, the pelvis tilts forward, shifting the center of gravity and causing internal rotation of the femoral columns so that knock-knees and pronated feet are likely.

The most common postural deformities are (1) ventral displacement of the head with increased flexion of the neck, (2) round shoulders and flat chest, (3) increase of the anterior posterior curves of the spine, (4) forward tilt of the pelvis with prominence of the lower abdo-

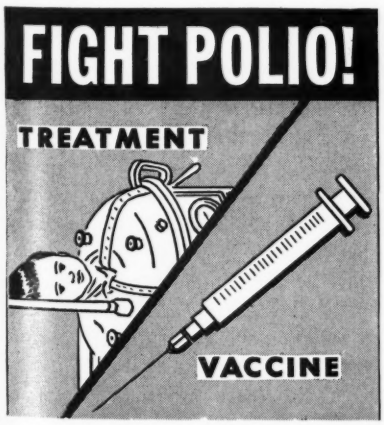
men, and (5) torsion of the upper and lower legs with knock-knee or pronation of the foot. Continuous abnormal posture will lead quickly to muscular tightness and to limitation of motion of the spine and extremities, and slowly worsens.

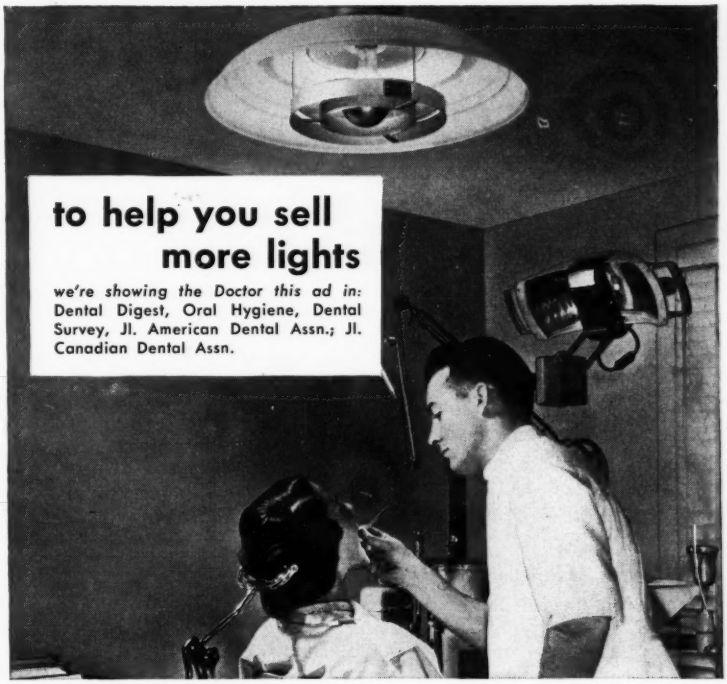
The child should not be forced to sit up before his muscles are strong enough. When sitting of his own volition the child should sit on something that fits his body so that his entire back is propped and support is also provided for the feet. Crawling and climbing should be encouraged to develop the big muscle groups.

When the child begins to stand and walk training in good postural habits can be started. The parents should tell the child to hold the head up, well balanced over the shoulders and torso. Most children learn this in a few weeks. Then the child is taught to retract the abdomen and to stand as tall as possible. Attention is given later to any faults in body balance. Properly fitting clothing and shoes are important, as well as suitable furniture.

The use of apparatus is never necessary for children with normal musculature but may be required in a case of permanent weakness, of short leg, or other fixed deformity.

Kuhns, John G.: The Early Recognition and Treatment of Postural Deformities, Arch. Pediat. **70**:213-218 *(August)* 1953.

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A Mouthful of Wire

A poor benighted schoolmarm who supervised the affairs of an English boarding school lamented the broken wires and lost retainers among her charges who were undergoing orthodontic treatment. The soul was so distressed and distraught that she wrote to the *British Medical Journal* to describe her plight.

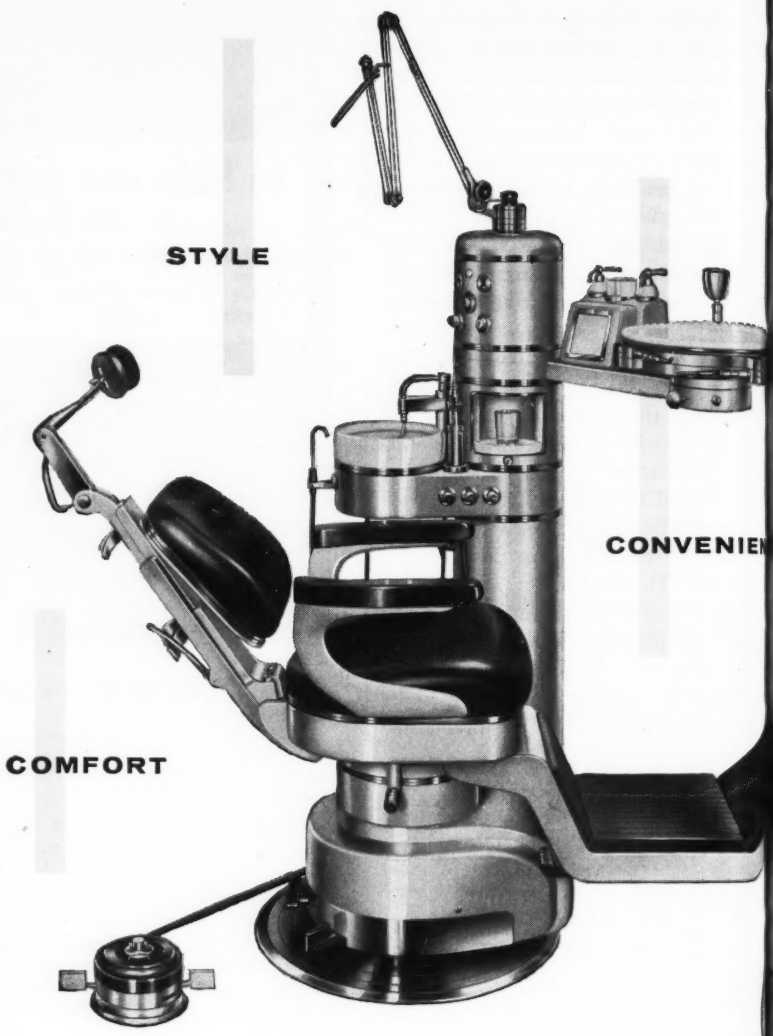
The British character is somewhat different from the polyglot that makes up the personalities of the peoples of the United States. The Englishman is more gifted, it seems, with the emotion of indignation and the power of expression. He is fervent to write letters to the editor and good indeed are many of these letters. They are of high literary skill and individuality—surprisingly free from cliches and the formal stiffness of American business letters. They show pride in the talent of expression.

Two writers who responded to poor Miss Carter's woe over a mouthful of wire were N. J. Ainsworth and Philip G. Capon, gentlemen with Dickensian names. Their letters follow:

"Sir,—Some sympathy must be extended to Miss Mabel E. Carter as the headmistress of a boarding-school in her difficulties with those pupils who are wearing orthodontic apparatus. To some extent the problem is more peculiar to this country than in any other, because in our educational system we make greater use of the boarding-school, many of them being in rural areas far from dental facilities. A headmistress is therefore *in loco parentis* for some nine months of the year.

"The fact that a child has irregular teeth means that their positions are the visible manifestations of errors in bone development even to the extent of actual deformity. The object of undertaking orthodontic treatment is an attempt to produce a functional oral cavity, thereby reducing the risk of dental caries and paradontal disease. It must not be forgotten also that for psychologic reasons—and these certainly apply to a woman—esthetics are important. Whereas the dentist is attempting to influence dental development, the headmistress is concerned with mental development, and she is naturally irritated with anything which disturbs the school routine. Miss Carter, in her position, must accept the fact that regular adjustments of apparatus are almost always necessary, but she may recently have had the misfortune to have had charge of certain children discovered after the fitting of appliances to be 'breakers.' Such patients have a remarkable facility for damage and loss.

"Orthodontic treatment is not a 'new craze,' neither should it be considered an 'affliction' on the child. It



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must be viewed within the general picture of prevention, control, and repair of child dental health. It is recognized and appreciated by the dental profession that the interest and care of the teaching profession in dietetics and development during the dental formative period is invaluable to the dental future of the adult."
(Signed) Philip G. Capon.

"Sir,—The letter from Miss Mabel E. Carter asking for opinions on the desirability of orthodontic treatment in school-children prejudges the issue by its tendentious tone and might well provoke an acrimonious debate on the whole subject unless ruled out of place in a medical journal.

"May I, as one having a foot in both camps, medical and dental, endeavor to answer the question whether treatment is medically justifiable? Generalizing is impossible, but in a great many cases failure to correct deformities may saddle the child with a permanent disfigurement which at best is a source of constant mild regret and at worst may be a severe psychologic handicap. On the physical side, though these irregularities do not hinder mastication seriously, they may, and often do, lead to premature loss of teeth either from direct trauma when incisors impinge on the gingivae of opposing teeth, or from gingivitis leading to pocketing and the usual sequelae. As regards the specific disadvantages mentioned, Miss Carter's experience must be exceptional or her case overstated. The average appliance does not 'afflict' the child. It is common for a young patient, inspired no doubt by the competitive spirit, to express a lively hope that a plate will be necessary, and equally common for him to feel unnatural and even uncomfortable when not wearing it. Only in a minority of cases does an appliance affect speech for more than the first few days of wearing it. Eating in some cases may be impeded during a short stage of treatment where the act of

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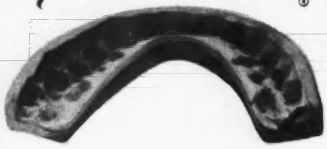

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biting is utilized to produce tooth movement, but most appliances which would interfere may be taken out for meals, and no fixed apparatus if properly designed should hinder mastication.

"The frequent adjustments referred to are presumably those carried out by the child; these are necessarily extremely simple, effected in seconds and at regular stated intervals. Adjustments carried out by the orthodontist are only frequent in exceptional cases; obviously no dentist would wish to bring the child from school to his surgery if it could be avoided. Wires do break, since the need for gentle pressure requires that they shall be slender, but this is not in my experience a frequent mishap, and in only a minority of such cases is there resulting discomfort necessitating an emergency visit. Only too often such breakages are only discovered by the dentist at the end-of-term visit.

"In short, though all the horrors enumerated by Miss Carter can occur in isolated cases they are not necessary hazards of treatment and taken in the mass they are exceptional, especially now that an increasing number of cases is being treated by the Andresen appliance which is suitable for several varieties of irregularity, is worn at night only, has no delicate parts to bend or break, and places no strain on child or teaching staff. As a postscript I might add that I have just shown Miss Carter's letter to the mother of a patient, and her only comment was that the irritable and tearful children mentioned would probably be types who would have been so in any case." (Signed) N. J. Ainsworth.

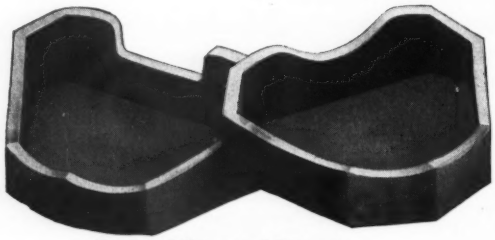
Hambly Rides Again!

It has now been several months since we published anything from that dental literary jewel of 1897, Hambly's *The Practice-Builder-Confidential.*

To one who was himself nurtured on the sterling goodness of the characters of Horatio Alger, I can feel the righteousness of Doctor Hambly as he writes about women. To the dentists who are younger in years and who were never exposed to this kind of pre-World War I literature the advice on the care and treatment of women as given by Hambly will seem quaint and faraway.

On dental assistants and married women he writes with intense feeling: "More or less trouble has been caused by pretty women from the very beginning of history. Of this we have no desire to treat. As Rudyard Kipling would say, 'That's another story.' What is of special interest to us is a consideration of the moral relations of dentists and the members of the opposite sex with whom they are thrown into association.

"The greater proportion of those for whom the dentist is called upon to operate are women, and among this proportion it is not at all strange that many should be possessed of proclivities of a more or less hilarious nature. Right at the beginning of his professional career every dentist must decide upon which course he proposes to adopt with reference to this matter. Either he is going to 'have fun,' or he is going to make for himself a reputation. If he goes in to have fun, he must abandon all hope of attain-



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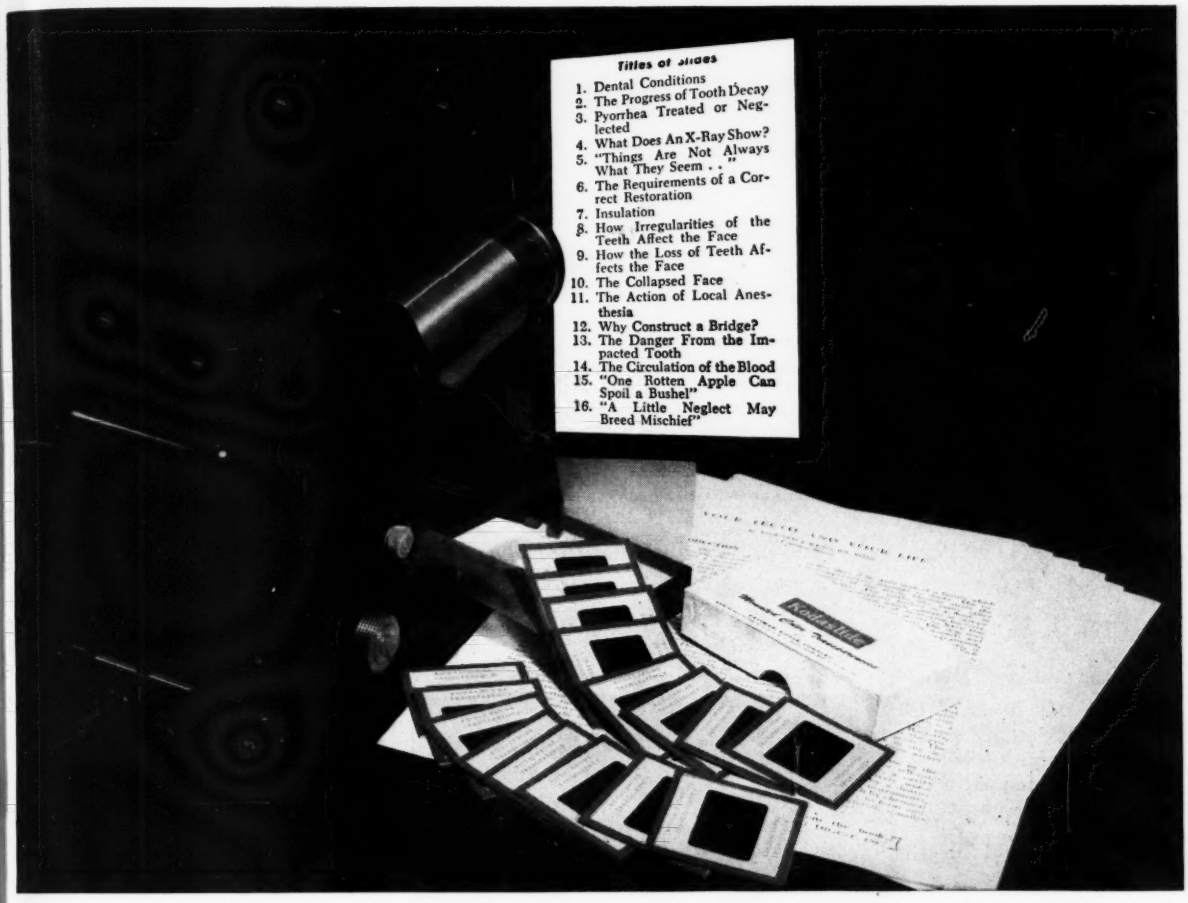
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ing a reputation; not that he cannot have fun and attain a reputation too—but the reputation will not be as abidingly satisfactory as that which is based upon a foundation upon which no taint of moral obliquity rests. These little things have a way of leaking out, and when they do leak out they gain a circulation in a surprisingly short time, and once having gained a circulation it is impossible to overcome their unfavorable effect; stories reflecting on the morality of professional men cling persistently, and their evil influence cannot be counteracted by years of the most punctilious conduct.

"One of the most frequent causes of trouble to a dentist is the selection of a very pretty female assistant. A pretty assistant is all right but she should not be too pretty. A girl assistant should be selected who is not too good looking, and who knows her place and how to keep it. No familiarity of any kind should be tolerated, and the assistant should refrain from addressing her employer in any but the most respectful manner. No joking nor laughing, and no attempt to join in conversation with the dentist and his patients should be tolerated. If it comes to the ears of the dentist that unkind aspersions are being made with reference to his assistant and himself, he should at once dismiss the assistant and get another. This is justice to both.

"Be especially careful in your treatment of married women; do not for one instant engage in conversation that savors of questionable subjects, and do not permit yourself to be drawn into such conversations. Married women are the most reckless of all those who exhibit freedom of speech and action. They do not seem to care."

We have been over a long road since 1897. Now we pick our assistants, in part at least, for pulchritude. Jane Russell is a fine example of a former dental assistant. The public seems to prefer pretty girls in a dental office and if they refrain from joking or laughing or joining in the conversation they are not liked by patients or by their dentist-employers. We encourage our assistants to be as personable as they can be and if "unkind aspersions are being made," most of us are a little amused, and some of us, if we are old enough, may be a bit gleeful at the sinister gossip.

As for married women, dentists would be in a sad way without their patronage and good will. Some of them do tell a salty story on occasion, but I have yet to know of a dentist who has been seriously debauched or degraded by such conversation. It takes more than talk to destroy a character: either by the "unkind aspersions" or the risque stories between the married woman and her dentist. Being too prim and proper is one way to lose contact with reality. Doctor Hambly seemed like a stuffy fellow bursting at the moral seams with self-righteousness. —E. J. R.

Temporomandibular Arthritis, Mandibular Displacement and Facial Pain

(*Continued from page* 23)

ous dental origin are most likely to present to a medical practitioner who may fail to diagnose the condition. This emphasizes the need for education of the medical profession in the recognition of the fact that temporomandibular arthritis due to mandibular displacement is a common cause of facial pain.

Treatment — In all but three instances dentures were constructed which were either full or partial dentures according to the need. In the three cases splints were made, one of which was successful, but the others produced no improvement. In all patients treated, the functional position of the mandible was altered, the so-called "vertical dimension" being increased. In some, a repositioning of the mandible in advance of the most retruded position was also adopted.

Results of Treatment
Table 3

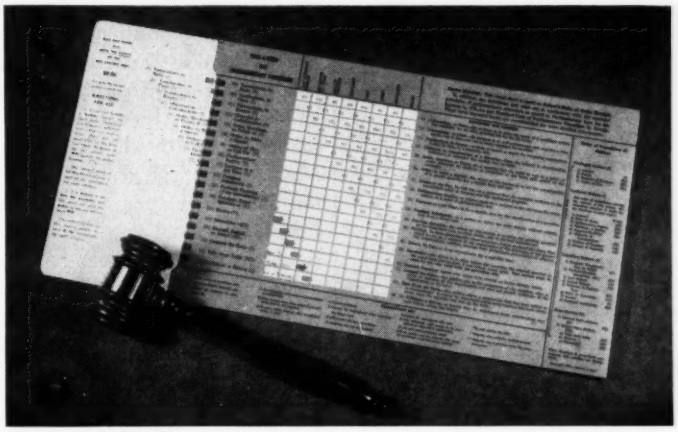
Relieved of symptoms	20
Much better	13
Improved	11
No better	5
Worse	2
No reply	4

If patients classified as improved, much better, and relieved of symptoms are regarded as successful, then out of 51 cases where the result is known, 44 or 86 per cent were at least improved by dental procedures.

Time Elapsed Since Successful Treatment Completed
Table 4

Time Elapsed	No.
Up to 3 months	17
4 to 6 months	7
7 to 9 months	7
10 to 12 months	8
1 to 2 years	5

A little less than half the patients have been either completely free of symptoms, much better, or improved for over six months, and the remainder for periods up to six months.



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Part Two—Fundamental Concepts

The whole masticatory mechanism, the growth and development of the face and jaws, the physiology of dentition, the physiology of muscle tone and posture, and the pathologic changes that can occur in these processes must all be studied. Every branch of dentistry is affected, and Costen's syndrome is only a small part of the problem. However, Costen deserves credit for drawing attention to some of the ill effects of change in the functional position of the mandible.

The Rest Position—The first basic principle is the physiologic rest position of the mandible. This is determined by muscle tone, and is a postural reflex similar in its physiology to the rest position of the other muscles concerned in the maintenance of posture. Posture is characteristic for each animal species and for each individual person.

Freeway Space—In the normal person, the teeth are not in contact in the

CLINICAL AND LABORATORY SUGGESTIONS

(See pages 30 and 31)

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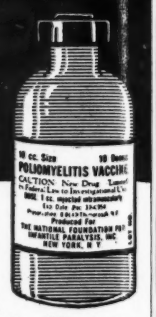
rest position, and occlusion can have no influence upon it. The distance from the rest position to occlusion, usually two to three millimeters, is called the freeway space. The rest position is relatively stable, but can be influenced by stimuli affecting the reflex pathway. The general position of the head in relation to gravitational forces, emotional states, pain, and fatigue can affect all postural reflexes, including those responsible for maintaining the normal rest position of the mandible. All voluntary jaw movements start from the physiologic rest position.

Terminal Functional Position— The movement of the mandible from the rest position to the normal terminal functional position (called centric occlusion), is a simple hinge movement of two to three millimeters. However, once occlusal contact is established, a new controlling mechanism takes over. Functional movements are determined by the occlusal relationships and inclined planes of the teeth. Mastication, like walking, is a conscious act performed by groups of voluntary muscles. It tends to become automatic or habitual. Nevertheless, unlike physiologic rest, mastication is directly under cortical control, and is influenced by sensory impulses reaching the cortex from the periodontal membrane.

Movement from the Physiologic Rest Position to the Terminal Functional Position— This movement in the normal person with normal occlusion is a simple hinge closure, the axis of rotation is in the condyle head, and the terminal position coincides with centric occlusion. The temporomandibular articulation plays no active part in determining either the rest position or the functional position. It is possible to masticate without condyles.

Effect of Mandibular Displacement on the Temporomandibular Articulation—Although the temporomandibular articulation is passive in actual mastication, it is only capable of a comparatively small range of adaptation to changed occlusal circumstances. This range of adaptability may be termed the physiologic limit

Polio Vaccine Facts



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of adaptation. When occlusion is abnormal, the patient adopts a terminal functional position which "feels all right."

Position Determined by Occlusal Pattern—Following loss of molar support, the mandibular incisors will slide up the lingual slopes of the upper incisors until stopped by occlusal contact, or by the palate if no posterior teeth are present. This movement is no longer a hinge movement, but is a distal and upward displacement of the whole mandible in which translatory movements of the condyles occur. The functional position of the condyle is displaced upward and backward compared to the normal, and movements about this abnormal position throw stress on a part of the joint not adapted for resisting masticatory stresses. As a result, a traumatic arthritis with the characteristic symptoms often results.

Displacements May be in Any Direction—Slight degrees of displacement may, however, be within the normal physiologic limits of adaptation, and no symptoms will result. Mandibular displacements may be in any direction depending on the occlusal pattern; in addition to retrusion, the jaw may protrude beyond the upper incisors or move to right or left. A rotated upper first bicuspid on the left side has been observed to throw the functional position of the mandible to the right with resulting arthritic joint symptoms.

The Supporting Structures—An alteration in functional position may also result in changes in the supporting structures, the periodontal membrane, and alveolar process. As in the joint, the occlusal stresses may be within physiologic limits, and slight changes in tooth position will occur without pathologic results. If beyond physiologic limits, traumatic occlusion will follow, or pathologic resorption of alveolar bone with the signs and symptoms either of periodontitis or of abrasion of tooth surfaces or both. These two compensatory mechanisms, one in the temporomandibular joint and the other in the supporting structures of the teeth, enable minor displacements to occur without symptoms or signs of dam-

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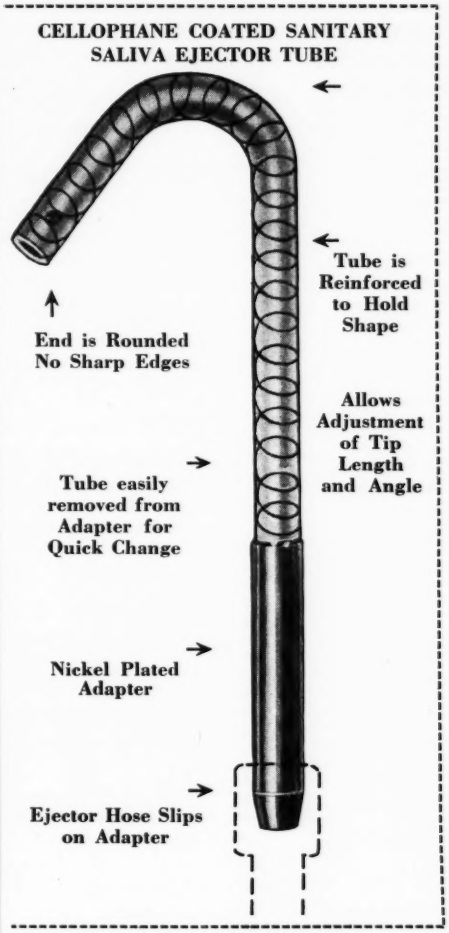
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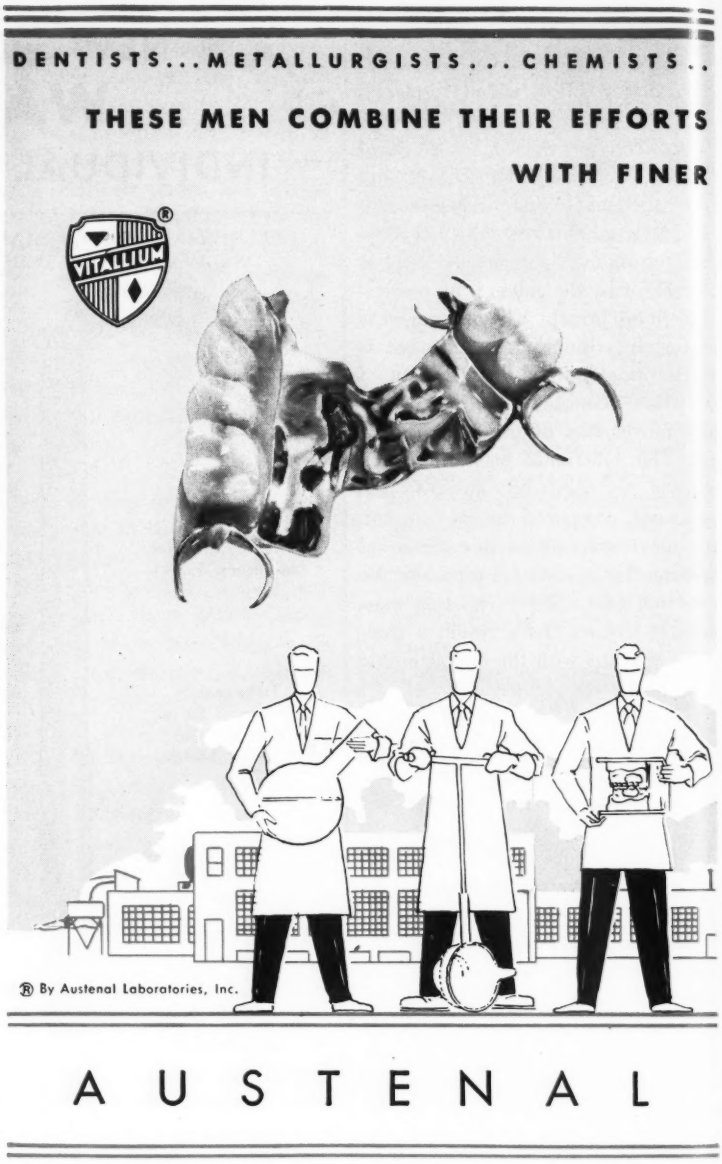
age, and it is doubtful if therapeutic procedures should ever be carried out in such cases.

The Age Factor—If a child adopts an abnormal functional position due to an abnormal occlusal pattern, nonpathologic changes will occur in the temporomandibular joint. Patients with Class II malocclusion due to posterior displacement develop a steeper inclination of the articular surface of the eminentia, while Class III cases due to anterior displacement develop a flat eminentia. Similar changes take place in the condyle head. The age of the patient and the gradual onset of the abnormal occlusal pattern permit these compensatory changes to take place and no temporomandibular arthritis or periodontitis ensues. From the orthodontic viewpoint, there is a growing appreciation of the effect of this concept on diagnosis and treatment.

Arthritic Symptoms from Overclosure—Retrusion, protrusion, or lateral displacement only occur according to the occlusal pattern. The edentulous patient with resorbed ridges and old dentures usually develops a simple overclosure, and the rest position remains unchanged. Arthritic symptoms often develop in these cases due to the fact that function is only possible with the teeth in occlusion and bringing the teeth into occlusion by overclosure will force the condyle head to rotate backwards into the posterior sector of the joint, which is not provided with dense fibrous tissue designed to resist pressure.

Common Misconception—The articular disc is composed, not of cartilage, but of dense fibrous tissue. Similarly the articular surfaces of the condyle head and eminentia are covered by dense fibrous tissue. The only cartilage present lies between the fibrous articular surface of the condyle and the bone. The posterior portion of the disc is composed of loose connective tissue containing blood vessels and nerves and is not designed to resist the stresses of mastication. Thus, the significance of posterior and superior displacement of the condyle head in relation to the disc is clarified by a knowledge of normal histology. The arthritic changes are simply due to masticatory stresses falling on an area of the joint not designed to accommodate them.



Part Three—Practical Principles

Determination of Rest Position—There are available clinically adequate methods for determining a close approximation to the rest position. The success of these is dependent to a large degree on the experience and insight of the operator, and no one method is infallible. It must be emphasized that all movements start from the physiologic rest position and displacement of the functional position arises through occlusal deformity.

Method Used—All occlusal contact must be avoided. The influence of gravity on postural reflexes makes it imperative that the patient should be sitting erect with the head unsupported. The patient should not be semisupine and the head must not be tipped back. The influence of emotional states, such as fear or excitement, can only be lessened by confidence in the operator. Sedatives are inadvisable as oversedation may affect muscle tone. The patient's attention should be diverted from the

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mouth, and to this end general conversation on topics not necessarily related to dentistry is an aid. The movements of the lower jaw in speech should then be observed carefully as all speech movements of the mandible start from the rest position.

Recording Rest Position—The repetition of *MNC* has been found useful. The operator's next problem is to record the rest position. This is not difficult using cephalometric radiography. Measurements taken from such radiographs have been demonstrated to be reproducible. For the general practitioner a simpler method is needed. Soft wax or compound, or a soft mix of plaster, can be used on bite-rims for the edentulous patient; soft plaster may be injected between the teeth where natural teeth are present.

Alternative Procedure—In patients with natural teeth an alternative procedure has produced satisfactory results. When the rest position has been determined, the patient is instructed to close slowly from this rest position and the point of initial contact is noted. Assistance is given by observing the abrasive facets on the teeth which act as a guide to the former normal occlusion. A record is made of the jaw relationship at the point of initial contact by the use of soft wax or plaster.

Record Transferred to Articulator—If the rest position has been recorded, centric occlusion is established by a simple hinge closure of the articulator from the rest position. Some authorities advise the use of a face-bow. Teeth are set up with two to three millimeters of freeway space.

Temporary Additions Made—Patients with abnormalities of movement, clicking, or retrusion of condyles have also been tested by placing the little fingers in the external auditory canals. Often the restoration of the normal occlusion eliminated the noises and clicking in a most spectacular fashion, and the changed feeling in the external auditory canals was clearly apparent.

Diagnosis Based on Therapeutic Procedures—Diminution of the vertical dimension due to loss of occlusal support produces obvious signs familiar to the dental profession. The most important sign is increase in freeway space. The only difficulty lies in deciding whether bodily displacement of the mandible in other dimensions has occurred. In simple terms, diagnosis of posterior displacement is often based on the testing of therapeutic procedures. If correction is accepted readily with relief of symptoms, the provisional diagnosis can be regarded as confirmed.

Comment

It must be pointed out that repositioning in advance of the most habitually retruded position is still a controversial issue. It is therefore doubtful if the general dental practitioner should attempt this procedure until experimental work in progress clarifies the situation.

Adapted from *The Official Journal of the Dental Association of South Africa* **5**:430-436 (September 15) 1950.

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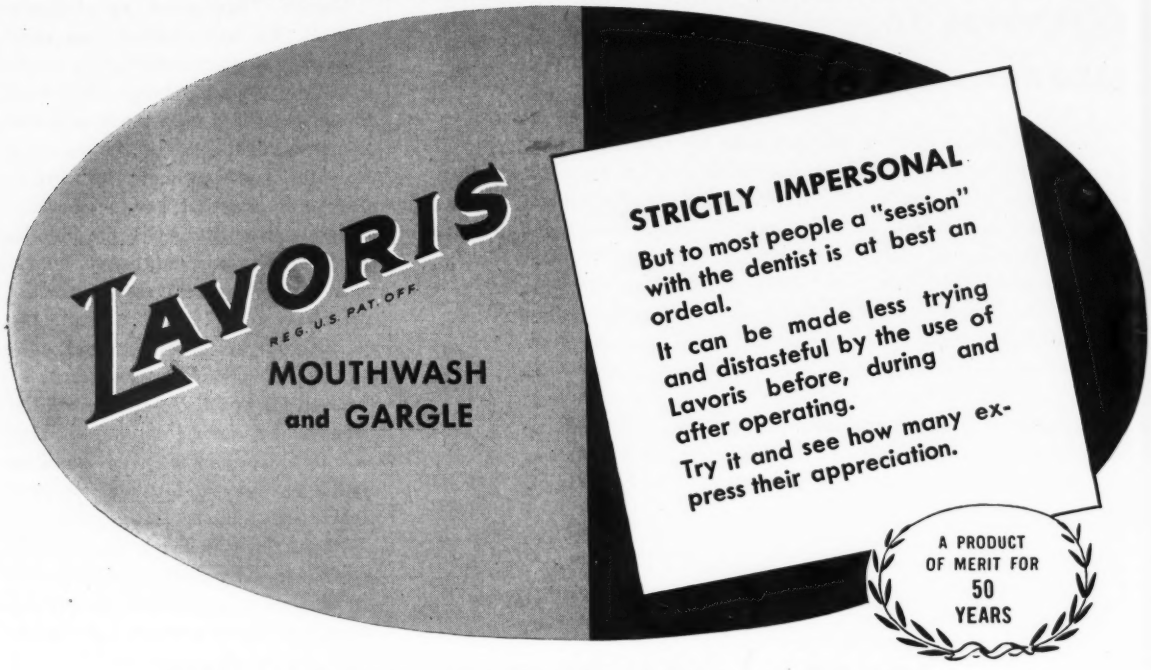
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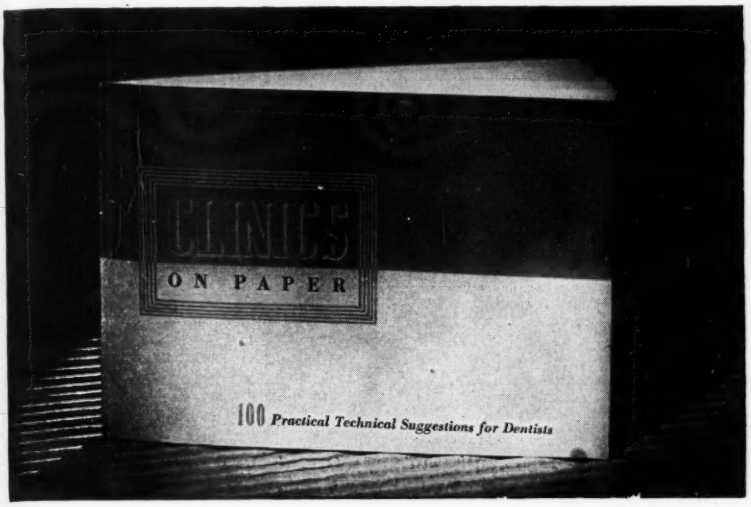

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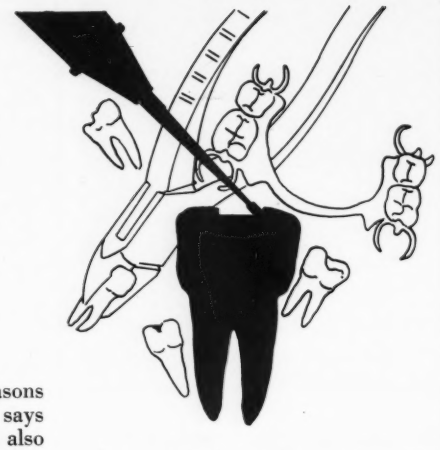

When NOT to Extract

There are only five valid reasons for extracting an anterior tooth, says Doctor William R. Eberle, who also urges that "virtually *no* teeth be sacrificed if they have value in supporting articulation." He claims that dentists harm their practices (as well as do injury to their patients) by unwarranted extractions since "a large per cent of the public understand that extraction is the easy and quick way out of dental difficulty but not necessarily the best."

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"Select Your Tax Expert With Care," advises M. A. Patrick. A self-styled "authority" without proper qualifications can cost you money, not only in fees, but in penalities and interest. It will pay you to investigate before you entrust your tax return to anyone other than an official of your local Bureau of Internal Revenue.

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An unusual honor has come to a West Coast dentist. Former Brigadier General Roy A. Green, an oral surgeon in civilian life, has been named commander of northern California's 49th Infantry Division, with the rank of Major General. He is a native of Sacramento and a graduate of University of California College of Dentistry.

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Doctor C. L. Meistroff is an enthusiastic "Ham Radio" operator. He claims that his hobby not only gives him relaxation and enjoyment, but also provides a means of acquiring friends (and sometimes patients). If you, too, are a "Ham," perhaps you will want to call W 4 T F A and tell Doctor Meistroff you've read his article.

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"My Life in Dentistry Begins at 50," announces John G. Ault, a man with twenty-five years' experience in the field of Public Health. He is now a student in the College of Dentistry, University of Tennessee, having matriculated at an age when many men are already thinking of retirement. He believes that his background of health service and his dental knowledge will be a valuable combination in a new career.

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"Are Children's Fears in the Dental Office Real?" asks Charlotte Fried, a dental hygienist. She points out the difference between *normal* fear and *anxiety* fear, and explains how both may be minimized by proper handling of the child patient. She also points out that "*life is geared for adults only*, and therefore, we should not expect the child to adjust intuitively without our guidance, patience, and understanding."

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A Connecticut statute prohibiting advertising in the practice of dentistry was amended to include dental laboratories within this prohibition. A few months ago this amendment was declared to be unconstitutional by the highest court of that state. Albert Woodruff Gray gives the details.

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The *Chicago Daily News* recently carried an interesting story of courage and optimism. Doctor Thomas Michiels, almost completely paralized by poliomyelitis two years ago, is now planning to open a dental laboratory and personally supervise service for his dentist friends. His neighbors and dental school classmates raised over $15,000 to help him. Robert Seaver tells the story.

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